BUREAU OF HYGIENE AND TROPICAL DISEASES.

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## BERIBERI.

ANNALES DE MÉDECINE ET DE PHARMACIE COLONIALES. 1930. Oct.–Nov.–Dec. Vol. 28. No. 4. pp. 613–621. Une enquête récente sur le béribéri en Cochinchine (d'après le rapport annuel de la Cochinchine). [**Beriberi in Cochin-China.**]

CAZANOVE. Une enquête récente sur le béribéri en Cochinchine.—*Bull. Office Internat. d'Hyg. Publique.* 1931. June. Vol. 23. No. 6. pp. 1059–1064.

In 1927 the number of beriberi cases admitted to hospital in the countries of the Indochinese Union was 2,456. In 1928 the number was 3,669 distributed as follows: Tonkin 162, Cambodia 60, Annam 22 and Cochin-China 3,425.

A table is given showing the number of beriberi hospital admissions in Cochin-China since 1916. Thus in 1916 there were 988 admissions with 197 deaths; in 1927, 2,159 admissions with 595 deaths; and in 1928, 3,425 admissions with 600 deaths. This increase is found to be due to a recrudescence of the disease in the Western provinces of Cochin-China, the numbers in the Eastern provinces remaining fairly constant. The reason for this local increase is that the Western provinces are rich and the natives have substituted mechanically polished rice for the coarser variety. It is stated, however, that the diet, with the exception of rice, has a sufficient vitamin content.

On the clinical side, it was found that the dry form of beriberi is the more common; that it is in the rarer, wet form that sudden cardiac complications are encountered; and that the disease is rare in children and common in pregnant women, especially during the later months.

The treatment recommended by BERNARD has given satisfactory results. This consists in stimulating gastric activity; correcting the hydrochloric acid deficiency with "limonade chlorhydrique"; the exhibition of purgatives; omitting, or considerably reducing, starchy foods in the diet, and replacing them with meat, fresh fish, green vegetables and fruit. Strychnine proved of some value in treating nervous symptoms. Lastly, the Governor of Cochin-China issued instructions recommending the use of incompletely decorticated rice

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according to a special formula. Rice thus prepared, either taken solely or mixed with the polished variety, gave satisfactory results but it is still too early to base arguments upon them.

The remainder of the paper deals with reports from local medical men concerning the extension, etiology, symptoms and treatment of beriberi in the various provinces of the country.

A. D. Bigland.

BAILBY (Jean). Etude clinique de quelques cas de béri-béri. [**Clinical Study of Cases of Beriberi.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1931. May. Vol. 9. No. 5. pp. 281–292.

A small outbreak of beriberi occurring among "disciplinaires" at Dap-cau is described. The first case was noticed at the beginning of March, and by April 10th there was a total of 21 cases among 102 men. About the same time, a small outbreak of diarrhoea was also reported.

Immediate steps were taken to deal with the beriberi epidemic and most satisfactory results were obtained in a surprisingly short time. The chief measures employed were: (1) *lessening the hours of work.* On February 1st (i.e., before the outbreak), the daily amount of work had been increased from 8 to 10 hours. Later it was reduced to 9 hours. (2) *Modification of the diet.* The daily ration of rice was reduced from 820 grams a day to 500 grams and the difference made good with vegetables and fruit. After April 10th (when 16 new cases were discovered) polished rice was entirely replaced by imperfectly decorticated rice and the amount increased to 700 grams. The ration was also increased in respect of fresh meat, fat, fish, fresh vegetables and fruit. The salt ration was slightly diminished.

The author stresses the fact that it was the alteration in the quality of the rice and not the quantity nor the increase in meat, vegetables and fruit which brought about the rapid relief of symptoms and apparently put an end to the outbreak.

The origin of the epidemic seems to have been associated, on the one hand, with physical fatigue, and on the other, with a B-avitaminosis. No evidence of any infection was noted. In addition to dietary alterations, treatment consisted in complete rest, purging with sodium sulphate and the administration of digitaline in small doses to those patients in whom oedema was marked.

A clinical description of the disease, with details of some of the cases, is given.

A. D. B.

JANTZEN (Walther). **Beriberi-like Polyneuritis.**—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 96–101. [Truxillo Railroad Company Hosp., Puerto Castilla, Honduras.]

There have been previous reports of cases showing a beriberi-like polyneuritis in the Truxillo Railroad Company Hospital, Puerto Castilla, Honduras. In the years 1925–1927 there were 5 cases, in 1928 18 cases, and in the years 1929 and 1930 there were 11 cases in each. Similar cases have been observed in Trinidad de Santa Barbara, Honduras. Almost all the patients were adult males and not more than one case occurred in any one family.

The clinical features of the recent outbreak are similar to those observed in former years, i.e. the type in which motor dysfunction predominates, and those milder cases in which sensory symptoms are chiefly noted. Oedema, except for a slight swelling of the legs, is absent.

Meat, corn, beans, cheese and rice are the main foods used by the patients, and the author believes that food deficiency will not explain the clinical findings and that it is impossible to say that the diet is very poor in vitamin B. Moreover, it is pointed out that this diet is common to all the middle and lower class Hondureans and that, if it were at fault, the disease should be very much more widely spread than it is. The influence of inorganic poisons, alcoholism, syphilis and malaria can be excluded. Improved social conditions do not lessen the liability to the disease.

The prognosis is good, but the disease may be of long duration. Some cases under observation for a time have remained well, but relapses do occur. During a period of 5½ years, only two fatal cases were encountered. Both of these died from cardiac failure. Two cases are described in detail, one presenting typical appearances and the other being the second of the two fatalities.

The author is of the opinion that the question whether the condition is beriberi or a polyneuritis of unknown origin, remains unanswered. The absence, or great rarity, of oedema and the presence of vitamin B in the diet constitute the two chief difficulties in diagnosing beriberi.

A. D. B.

DE ARAUJO (Eduardo). Beriberi e bacillus beriberi Matsumura et al. 1929. [**Beriberi and Matsumura's Bacillus.**]—*Brasil-Medico.* 1931. July 25. Vol. 45. No. 30. pp. 686–691. English summary.

The following account is taken from the English summary. After reviewing the theories of the origin of beriberi, the author shows that that of Vitamin B deficiency does not fit the beriberi of Bahia, Brazil, where the disease occurs in the state jail and insane asylum. The diets here are not poor in Vitamin B. Some observations lead to a supposition of contagion; for instance the occurrence of beriberi amongst members of the guard, who are on a different diet, when the disease is prevalent in the jail. Agglutination tests were done with the Escherichia described by MATSUMURA, with the conclusion that this organism cannot be considered the specific cause of beriberi in Bahia.

A. G. B.

PAVY (A. B.). **Beri-Beri: its Medical and Economic Interest and Specific Treatment.**—*New Orleans Med. & Surg. Jl.* 1931. Feb. Vol. 83. No. 8. pp. 559–564. [1 ref.]

The chief etiological factor in beriberi is the bacillus discovered by Japanese physicians [MATSUMURA *et al.* this *Bulletin*, 1929, Vol. 26, p. 965]. Vitamins have no specific curative value though avitaminosis should be regarded as a predisposing factor in the disease. The drug urotropin (hexamethylenetetramine) is a specific for beriberi.

Details of treatment are as follows: Decayed, cheap rice, old wheat flour or old macaroni must be immediately removed from the food supply in order to prevent re-infection. A diet containing milk, eggs, meat and bread is recommended. For milder cases a saline purgative every second morning, preceded by calomel grains 6 at the onset, together with urotropin grains

7½ every four hours (four doses a day) should be given. Under this treatment pains in the legs and gastric discomfort will disappear in 48 hours, dyspnoea and palpitation in 3–4 days and cure can be expected in 15–21 days.

For acute and more advanced cases the only differences in the treatment are rest in bed and more drastic purgation. Thus, in the more obstinate cases in this class, in addition to the urotropin, calomel grains 4–6 with podophylin grain ⅓ should be given every fifth night in 2 grain doses at hourly intervals and followed by a saline. These patients are usually relieved in eight days and cured in six weeks.

It is important to note that only the best grades of urotropin should be used and that when given with plenty of water such complications as strangury and haematuria will be avoided. After 10–15 days continuous use of the drug it is advisable to stop the administration for three or four days.

The author claims that the above treatment has " never failed," though it has no preventive value. Seven cases are quoted in some detail.

A. D. B.

JANSEN (Bard Coenraad Petrus), KINNERSLEY (Henry Wulff), PETERS (Rudolph Albert) & READER (Vera). **The Curative Activity of the Antineuritic Vitamin of Rice.**—*Biochem. Jl.* 1930. Vol. 24. No. 6. pp. 1824–1826. [6 refs.] [Lab. for Physiol. Chem., Amsterdam & Biochem. Dept., Oxford.]

The vitamin from rice polishings has been isolated by Jansen and DONATH (1926) in a crystalline form. The present paper deals with the estimation of the activity of these crystals by curative tests on pigeons and rats and by their growth-promoting effects on Streptothrix corallinus.

It was found that these three methods of testing did not yield absolutely consistent results, but curative tests with rice vitamin crystals " gave the following activity per day dose of vitamin ; pigeon 0·007 mg. by injection, 0·009 mg. by mouth ; rat 0·005 mg. Tests upon the micro-organism S. corallinus gave 0·006 mg. per diem."

A. D. B.

AALSMEER (W. C.) & RICHTER (C. S.). Over den invloed van adrenaline op den diastolischen bloeddruk bij de beri beri en de beteekenis daarvan voor de cliniek. [**The Influence of Adrenalin on the Diastolic Blood Pressure in Beriberi and its Significance for Diagnosis.**]—*Nederl. Tijdschr. v. Geneesk.* 1931. July 4. 75th Year. No. 27. pp. 3539–3546. [5 refs.] [Dutch Indies Med. School, Soerabaja.]

An adrenalin reaction, as it may be called, was to be expected from the fact that not only the ganglion cells of the sympathetic nervous system but also the suprarenals are affected in beriberi. This reaction is manifested especially in the definite effect on the minimal blood pressure. If this pressure is already zero, naturally the effect is not evident, but it is usually found that some rise in the diastolic pressure occurs simply after admission to hospital and that then the test can be applied. An example of this test is as follows :—A patient was admitted with positive crural vascular murmur and blood pressures becoming successively day by day, 95/25, 100/25, 100/35, 100/40, 100/45, 100/50, 100/50, 105/60, 105/60, 105/60, 110/60, 115/60 and 115/65, with ultimate loss of the vascular murmur. On the 2nd day,

with blood pressure at 100/25, an injection of 1 mgm. adrenalin was given subcutaneously and pressures read every 5 minutes with these results :—90/0, 90/0, 90/0, 90/0, 95/0 and 95/0. A second injection was given on the 11th day, by which time the blood pressure had the value 105/60 ; the effect of the adrenalin was similar but not so striking. The authors conclude that the test is of use as an indicator of the stage of the disease and of the therapeutic effect. It is especially the minimal or diastolic pressure which is significantly affected and in this respect beriberi may be grouped along with aortic insufficiency and exophthalmic goitre in its reaction to adrenalin.

W. F. Harvey.

Sargent (Willard S.). **Early Beriberi.**—*Ann. Intern. Med.* 1931. Apr. Vol. 4. No. 10. pp. 1340–1343. With 1 fig.

Two cases of early beriberi occurring in Japanese fishermen, aged 23 and 19 respectively, are described.

A. D. B.

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Advier. Quelques éléments du diagnostic différentiel du béribéri.—*Marseille-Méd.* 1931. Jan. 25. Vol. 68. No. 3. pp. 104–109.

de Araujo (Eduardo Lins Ferreira). Em torno da etiologia do beriberi. (Investigação preliminar.). These de livre escolha para concurso de professor cathedratico da Cadeira de Medicina Tropical.—pp. xvi+163. [16 pages of refs.] 1930. Bahia : Officinas da Livraria " Duas Americas ", Praça da Inglaterra.

Belfanti (Serafino). La dislocazione delle lecitine del riso e suo rapporto col beriberi.—*Sperimentale.* 1931. Oct. 3. Vol. 85. No. 4. pp. 195–213. [47 refs.]

Sarkar (Sarasi Lal). Epidemic Dropsy in a Family at Sandwip Island.—*Indian Med. Gaz.* 1931. Mar. Vol. 66. No. 3. pp. 121–124.

## PELLAGRA.

LOWE (John). **Pellagra in the Deccan. A Report on 40 Cases occurring among Lepers at the Leprosy Hospital, Dichpali, Hyderabad, Deccan.**—*Indian Med. Gaz.* 1931. Sept. Vol. 66. No. 9. pp. 491–500. With 14 text figs. [23 refs.] [Leprosy Hosp., Dichpali.]

About six years ago, pellagra was first observed in the Leprosy Hospital, Dichpali, Hyderabad. The cases were then only few in number and but one or two deaths were recorded. Since then, the disease has increased until in this year (1931) about 20 cases have come under observation. Some 40 in all have been reported, with about 10 deaths.

The disease appears in December, increases till March, and has cleared up by May. Of the 20 patients in 1931, 11 were females and 9 males (only about one quarter of the total inmates of the hospital are females). The age incidence varies between 14 and 40. Only about 6 of the patients contracted pellagra before admission.

The clinical manifestations were typical. The dermatitis appeared on the hands, forearms, feet, legs, face, neck, extensor aspects of the thighs and upper arms, the upper parts of the chest and back, and upon the genitalia. Intestinal symptoms were not marked. Lesions of the mouth were observed in about half. Nervous and mental symptoms did not constitute a usual feature. Some of the severe cases showed myocarditis with dilatation of the heart, tachycardia, dyspnoea and oedema of the feet. Cardiac failure was the usual cause of death. Of those patients who remained under observation six had recurrent attacks.

As regards diet, the following facts should be noted :

" The institution is a mission institution with limited funds and the dieting is done by each patient for himself : each patient is given half a *seer* (1 lb.) of unmilled rice each day, one *chapati* made from *jawari* flour with salt and a little *ghee*, one anna with which to buy sundries from the institution shop and firewood with which to cook his food. In addition, when available from the institution gardens, vegetables are issued, but only in small amounts and for limited periods. The one anna a day is spent in buying *dhal*, meat, fish or vegetables when available."

The diet is admittedly poor, but is probably better than that obtaining in the patients' homes. The caloric value is between 2,300 and 2,700 calories a day. This is insufficient even though the people are of small build and do no heavy work. The protein and fat are markedly deficient, and the carbohydrate excessive. Not only is the protein low in amount, but it is also poor in value. In addition, mineral salts and vitamin A are lacking. Finally, it should be noted, that the women's ration is less than the men's, and that some of the patients prefer to save their money rather than spend it upon extra food.

Treatment consisted in giving milk, meat, fruit and vegetables together with arsenic and tonics. Recently, yeast has been employed. The author has found [as other workers have done] that the mild cases recover without any treatment, and the severe cases die in spite of treatment.

There is considerable doubt as to the cause of the pellagra outbreak here described. The diet is, admittedly, poor in protein, but if this

were responsible the disease should be widely spread throughout Southern India, whereas, as a matter of fact, pellagra is rare. On the other hand, the incidence of the disease was much greater following the regular issue 12 months previously of a ration of 4 ozs. of bread made from jawari flour (a kind of millet). Against the possibility of this ration having any etiological significance is the fact that about 30 of the patients being Mahrattas eat no rice and take jawari as their staple diet, and yet no case of pellagra has occurred among them.

The observation that the disease is practically unknown in the surrounding district, and has broken out in this institution where the diet is poor, but no worse than outside, suggests the possibility of some local endemic infection being present, or that the leprosy, from which all the patients suffered, in some way rendered them more liable to pellagra.

Detailed case reports are given, and the literature is fully reviewed.

A. D. Bigland.

KUMER (L.). Ueber versprengte Pellagra in Tirol. [**Sporadic Pellagra in Tyrol.**]—*Wien. Klin. Woch.* 1931. June 26. Vol. 44. No. 26. pp. 849–852. [29 refs.] [Clinic for Dermat. & Syph., Univ., Innsbruck.]

Up to the War, Innsbruck was the only Austrian endemic centre for pellagra, cases being admitted from all the surrounding districts to the clinic for dermatology and syphilis. Since the War, South Tyrol, which was the chief endemic area, has come under Italian rule and the cases, therefore, go elsewhere. North Tyrol, however, having different racial and nutritional characteristics, still belongs to Austria and occasional cases of pellagra are still admitted to the Innsbruck clinic.

In 1925 MERK published the first case of endemic pellagra coming from the surroundings of Innsbruck. In 1926 ARZT met with two further cases, and in 1929 yet another two cases, here described, were recorded.

The author discusses various sporadic outbreaks of pellagra in Germany and in German-speaking areas, and reviews them in the light of the chief etiological theories of the disease.

Finally, he shows that the two cases described are true pellagra and not merely sun erythema occurring in alcoholic subjects.

A. D. B.

EUSTERMAN (George B.) & O'LEARY (Paul A.). **Pellagra Secondary to Benign and Carcinomatous Lesions and Dysfunction of the Gastro-intestinal Tract. Report of Thirteen Cases.**—*Arch. Intern. Med.* 1931. Apr. Vol. 47. No. 4. pp. 633–649. [28 refs.] [Mayo Clinic, Rochester, Minn.]

The authors summarize the results of their observations as follows :

" Pellagra developed in eight patients with obstructing benign lesions or dysfunction (late, after operation) of the upper part of the digestive tract, in two with obstructing carcinomatous lesions, in one with gastric syphilis and in two with lesions of the colon (one carcinomatous, one inflammatory). This secondary form of pellagra tends to support the theory that diatetic deficiency is the cause of the disease. In the cases reported, the clinical

manifestations of the disease were not as marked as those of the active endemic type of pellagra. Treatment may be ineffectual in cases with mechanical obstruction, or in those with marked impairment of motility of the upper part of the digestive tract, until the mechanical condition is corrected. Surgical intervention is attended by high mortality. Case reports covering the essential clinical features are submitted."

A. D. B.

GUHA (B. C.). **Vitamin $B_2$ and Pellagra. The Etiology of Pellagra.**—*Brit. Med. Jl.* 1931. July 11. pp. 53–54. [15 refs.] [Biochem. Lab., Cambridge.]

The author passes in review the work of GOLDBERGER and traces the growth of our ideas about pellagra etiology from the original protein deficiency theory to the now widely accepted belief that the disease is due to a lack of vitamin $B_2$ or P–P factor.

It is pointed out, however, that it is not yet clear whether human or experimental pellagra is really due to an uncomplicated deficiency of $B_2$ vitamin or whether the experimental dermatitis in rats is a true analogue of the human disease. As regards the latter, the following observations should be noted: the condition in rats cannot be reproduced uniformly by vitamin $B_2$ deficiency; very often arrest of growth in vitamin $B_2$ deficiency is not associated with skin symptoms; experiments of the author show that severe, but not complete, deprivation of vitamin $B_2$ leads to a generalized depilation in rats, not usually associated with lesions of the mouth and paws and rapidly cured by the administration of Eli Lilly's Liver Extract No. 343; small quantities of marmite sufficient to prevent beriberi favour the development of pellagra-like symptoms in rats; rice, millet and maize are all poor in vitamin $B_2$ but human pellagra appears to be especially associated with maize consumption.

Recent work [see the paper by BLISS below] suggesting that human pellagra, the experimental disease in rats and black tongue in dogs may be due to iron deficiency, is discussed. The author states that depilation in rats following upon a deficiency in vitamin $B_2$ was not due in his experiments to this cause, since the iron intake was sufficient to cover the requirements of the animal and the condition was not cured by the administration of haemin (25 mgm. per day) or haemoglobin (0·5 gm. per day). The observation that sugar in the diet causes pellagra symptoms in rats to appear more regularly is interesting in this connexion, since it has been shown that the fasting anaemic dog is more easily able to regenerate red cells and haemoglobin than the animal fed with sugar. The lowering of the red cell count in vitamin $B_2$ deficiency found by other workers was confirmed.

The author is of the opinion that: "Pellagra is a complex syndrome arising from an association of various factors, in which the deficiency of an antipellagra factor (Goldberger's P-P factor), which is possibly, but not necessarily, identical with the growth-promoting vitamin $B_2$, is the main but not the sole factor. Thus, iron might be one of the limiting factors, especially so far as depilation is concerned . . . vitamin $B_2$ may play a part in a particular phase of iron metabolism."

Finally, it is urged that the terms vitamin $B_2$ and anti-dermatitis (anti-pellagra ?) factor should not be used interchangeably as is the common practice.

A. D. B.

Bliss (Sidney). **Considerations leading to the View that Pellagra is an Iron-Deficiency Disease.**—*Science.* 1930. Dec. 5. Vol. 72. No. 1875. pp. 577–578. [2 refs.] [Med. School, Tulane Univ., New Orleans.]

It is claimed that the following considerations support the view that pellagra is an iron-deficiency disease.

Pellagra is practically unknown in very young children. Puppies, kittens, rabbits and babies have, at birth, an iron concentration about three times greater than that found in adults. The disease is more prevalent among women, especially during the age period 19–44 years. This may be associated with the menstrual loss of iron (which, it is calculated, may amount to 3 mgm. a day) and with the low iron content of the diet in the Southern States of America. The active agent in P–P factor (or vitamin G) may be iron, in view of its great thermostability and its absorption by kaolin.

Examination of the diet responsible for the causation, prevention and cure of black-tongue in dogs reveals that syrup of the iodide of iron was added to the curative and preventive diets, but not to the others. It is to be noted that the iron was added or withheld merely for the sake of the general mineral constitution of the diet. Those foods (beef, liver, egg yolk, yeast) which contain much P–P factor are rich in iron, while conversely pellagra-producing diets (molasses and corn bread) are poor in this constituent.

The anaemia associated with pellagra may be due to iron deficiency and the achlorhydria causing lessened absorption of iron due to increased alkalinity of the duodenum, may be of importance. Kollath found that the administration of alkaline haematin prevented symptoms appearing in rats fed upon a diet deprived of P–P factor. This protection may be due to iron.

In 51 cases of human pellagra iron was administered (orally in mild cases; intravenously in severe cases) with very encouraging results. In experimentally produced black-tongue in dogs the exhibition of iron by the intravenous route, without any alteration in diet, restored the animals to a normal appearance.

A. D. B.

Sabry (Ibrahim). **On the Chemical Nature of the "Pellagra Toxin" and the Discovery of the Thiosulphate Treatment of Pellagra.**—*Jl. Trop. Med. & Hyg.* 1931. Sept. 15. Vol. 34. No. 18. pp. 303–309. [Govt. Hosp., Alexandria, Egypt.] Also in *Jl. Egyptian Med. Assoc.* 1931. Dec. Vol. 14. No. 12. pp. 603–610.

——. **On the Chemical Nature of Pellagra Toxin and the Thiosulphate Treatment of Pellagra.**—*Lancet.* 1931. Nov. 7. pp. 1020–1022. [2 refs.]

——. **Note on Pellagra.**—*Jl. Trop. Med. & Hyg.* 1931. Dec. 1. Vol. 34. No. 23. p. 391.

The paper opens with a long technical account of the chemistry of pigmentation. The opinion is put forward that "the toxin of pellagra" must be causally related to the hyperpigmentation present in the disease. The toxin, it is suggested, is dioxyphenylalanine. This substance may exist in any cereal, but apparently beans are

the chief source. The author strongly disagrees with the vitamin deficiency theory of pellagra.

On chemical grounds, it was hoped that sodium thiosulphate would be beneficial in the treatment of pellagra, and that the exhibition of this drug would lead to the neutralization or disintegration of the toxic substance. In practice, it was found that this drug had a rapid curative effect upon the chief symptoms of the disease, viz., the skin lesions, diarrhoea, marasmus, insomnia and melancholia. The method of administration is to give a daily intravenous injection of 10 cc. of a 10 per cent. sodium thiosulphate solution. The solution is, of course, duly sterilized and the number of injections varies between 20 and 60. There are no contra-indications, and no complications have followed the treatment.

In a footnote the editor of the journal states that 24 cases of pellagra were so treated, the average number of injections being 36. Presumably, the patients were in hospital, but no mention is made of their diet.*

A. D. B.

TURNER (Roy H.). et al. **The Pathologic-Physiology of Pellagra. I. Tabulated Clinical and Physiologic Data** [TURNER (Roy H.)].— *Jl. Clin. Investigation.* 1931. Apr. 20. Vol. 10. No. 1. pp. 61–70. [5 refs.] **II. The Serum Albumin and Globulin** [TURNER (Roy H.) with BLANCHARD (Virginia)]. pp. 71–85. With 3 figs. [15 refs.]. **III. The Serum Calcium and Phosphorus, with Especial Reference to Nervous Symptoms** [Do. Do.]. pp. 87–98. With 1 fig. [13 refs.]. **IV. Serum Electrolytes and Acid-Base Equilibrium** [Do. Do.]. pp. 99–110. With 3 figs. [18 refs.]. **V. The Circulating Blood Volume** [TURNER (Roy H.)]. pp. 111–120. With 1 fig. [6 refs.] [Med. School, Tulane Univ. of Louisiana, & Charity Hosp., New Orleans.]

Pellagra is still not a disease of which it can be said that the etiology, diagnosis, pathology, prognosis and treatment are certainly known. Thus, for example, in spite of treatment along the most approved lines, more than 25 per cent. of the pellagrins admitted to the New Orleans Charity hospital die in that institution.

The present research was undertaken to accumulate more exact knowledge of the " pathologic physiology " of the disease. Observations were made upon 42 cases in the Charity Hospital, New Orleans. All had typical skin lesions and other manifestations of the disease. The group consisted of 6 white men, 9 white women, 9 negro men, 16 negro women and 2 negro children. 13 (31 per cent.) died in hospital. Only 3 had had previous attacks. Glossitis was present in 62 per cent. ; diarrhoea in 60 per cent. ; gastric analyses were carried out upon 34, of whom 29 were found to have achylia.

The first study was usually made one or two days after admission, and observations were repeated at 5 to 15 day intervals, so long as the patient remained in hospital. All were given a special diet.

" This diet has a daily caloric value of 2,500 to 3,500 calories, contains more than 100 grams of protein a part of which is liver or sweetbread, and

* In No. 23 (Dec. 1) of the *Journal of Tropical Medicine and Hygiene*, the author gives under the heading " Details of diet given to pellagra patients " the constituents of four diets, afterwards referred to as " this same diet " and notes that it has little or no effect on the cause of pellagra.—Ed.

contains an abundance of green leafy vegetables and 500 cc. buttermilk. It is given to patients with diarrhoea in bland form, and, when necessary, a liquid caloric diet of similar caloric value was given by gavage. Routinely there was included for the vitamin content 30 cc. of fresh brewers' yeast three times a day, 150 cc. of orange or lemon juice daily and, in addition, some of the patients received 4 cc. of cod liver oil three times a day."

The results of the biochemical examinations may be given shortly as follows :

(1) *Serum Albumin and Globulin Concentration.* 129 specimens of blood were examined from 42 cases. Apparently the average figure for serum albumin in the normal individual is 4·80 gm. per 100 cc. and the range is 5·65–4·20. All the pellagrins had, at some time, a serum albumin value below 4·20 per cent. and 95 per cent. of the cases had, at least, one value below 3. There was little tendency for the concentration of this constituent to increase during the disease and frequently it fell, even when the diet was adequate, as regards protein and vitamins. It is suggested that this low value is due to damaged digestion following upon injury to the alimentary tract, and is the result of pellagra, since in very early cases, the serum albumin content is nearly normal. In uncomplicated cases the serum globulin concentration was found to be slightly increased.

(2) *Serum Calcium and Phosphorus.* Under this heading, calcium concentration is chiefly considered. Estimations of calcium and phosphorus were made and the figure of the former was compared with the expected serum concentration, calculated according to Peters and Eiserson's formula (this formula is Ca=0·255 P+0·556 protein +7, when calcium and phosphorus are expressed in mgm. per 100 cc. and protein as grams per 100 cc.). It was found that among pellagrins there was a tendency for the serum calcium values to be considerably higher than the calculated values, while among other patients, without obvious bone disease, these two figures approximated. Abnormalities in serum calcium concentration among pellagrins appear to be related to disturbances of the nervous system. Whether these are causal or incidental has not yet been determined.

(3) *Serum Electrolytes and Acid-base Equilibrium.* The concentration of serum electrolytes tends to be low in pellagra and this is probably associated with diarrhoea and sometimes vomiting. There seems also to be a direct relationship between the lowering of the serum electrolyte figure and the severity of the disease.

In 125 determinations of the $CO_2$-combining power of the plasma, 84 per cent. gave results within the normal range. Marked increase of serum inorganic phosphorus is rare, and when present seems to be associated with oliguria resulting from diarrhoea and vomiting. In 32 per cent. of 53 determinations of " total fixed base " the figure was less than 141.

(4) *Circulating Blood Volume.* As regards plasma volume in pellagra, 32 per cent. showed a figure above normal and 68 per cent. below normal. 5 per cent. of the pellagrins showed a red cell volume above normal, and 95 per cent. below. Of the total blood volumes, 17 per cent. were above ideal values and 82 per cent. below.

A possible relationship between the magnitude of the blood volume in pellagra and the clinical features of severe skin lesions is discussed.

A. D. B.

Anding (Curt) & Sinani (Anna). Das Blutbild und physikalisch-chemische Veränderungen des Blutes bei Pellagra. [**Physico-chemical Changes in the Blood in Pellagra.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Mar. Vol. 35. No. 3. pp. 171–175. [8 refs.] [Therap. Hosp. Clinic, Med. Faculty, Odessa.]

Twelve pellagrins in Odessa Hospital with definite skin, tongue and alimentary symptoms were examined. The results may be given

shortly as follows : The specific gravity of the blood and the haemoglobin content were lessened in all cases. The red blood cells and reticulocytes were much reduced in number. The colour index varied around unity ; in only two cases was it greater than one. The above findings, together with the absence of pathological types of red blood cells, show that the anaemia in pellagra is of the simple secondary variety and not of the pernicious type, which the work of MOLLOFF seemed to suggest. There was also marked leucopenia and a relative lymphocytosis. Some of the more important physico-chemical findings were :

(1) Van den Bergh's test gave an indirect reaction in all cases. The figure for bilirubin was, as a rule, higher than 1·6. (2) There was no great change in corpuscular fragility. (3) The serum and plasma albumin, estimated by the refractometric method, was slightly less than normal. (4) Blood coagulation time was slightly accelerated (18 to 27 mins. as opposed to the normal 25 to 30 mins.). (5) Blood clot retractility was slightly greater than normal (7–12 mm. as opposed to the normal 6–8 mm.). (6) The expansile power (Dehnbarkeit) of the clot was normal. (7) There was no marked alteration in the blood platelet count, figures between 75,000–220,000 being obtained.

A. D. B.

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BOSCH (W. G.). Een waarschijnlijk geval van Pellagra bij een Javaan.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Apr. 1. Vol. 71. No. 4. pp. 382–388. With 9 figs. on 3 plates. [9 refs.] [Catharina Hosp., Dutch American Plantation Co., Kisaran.]

GUILLAIN (Georges), MOLLARET (P.) & LEREBOULLET (J.). Un cas français de pellagre avec paraplégie.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. Apr. 27. Year 47. 3rd Ser. No. 13. pp. 597–604. With 2 text figs.

ILES (U. G.). Psychosis with Pellagra.—*Med. Bull. Veterans' Administration* formerly *U.S. Veterans' Bureau Med. Bull.* 1931. Oct. Vol. 7. No. 10. pp. 937–939. [2 refs.]

KRJUKOFF (A.). Blut und Blutbildung bei schweren Fällen von Pellagra.—*Folia Haematologica.* 1931. Sept. Vol. 45. No. 2. pp. 196–206.

MARTIN (J. T.). Pellagra.—*Southern Med. Jl.* 1931. Apr. Vol. 24. No. 4. pp. 297–299. [9 refs.]

## UNDULANT FEVER.

Le Chuiton & Negrie. Deux cas de mélitococcie traités par les dérivés acridiniques et réflexions sur ce mode de traitement. [**Two Cases of Undulant Fever treated with Acridine Derivatives.**] —*Arch. Méd. et Pharm. Nav.* 1931. Jan.–Feb.–Mar. Vol. 121. No. 1. pp. 5–14. With 2 charts. [7 refs.]

The authors refer to previous reports of cases of undulant fever treated by acridine derivatives, acriflavine (British), trypaflavine (German) and gonacrine (French).

Two cases are described, the first that of a sailor infected in Oran by drinking goat's milk; a very severe case with high fever, enlargement of liver and spleen, and pleural effusion from which *Br. melitensis* was isolated in pure culture, as well as from the blood. The patient was admitted to hospital in the first week in March. By the middle of the month his condition was very grave and the prognosis gloomy. He was then given an intravenous dose of trypaflavine, 5 cc. of a 2 per cent. solution, and 4 days later 10 cc., and 5 days later 15 cc. Following on this last injection a marked improvement was at once manifest and the patient made a complete although slow recovery.

Case 2 was a laboratory infection; in his case gonacrine was employed and was given in the first week of the fever, 8 cc. of a 2 per cent. solution, followed by 15 cc. two days later and a third dose 6 days later. The fever abated and the whole illness did not last more than 3 weeks.

Discussing the employment of these drugs the authors detail their method of administration by the intravenous route and point out that a peculiar form of erythema may follow a dose of these acridine salts, due to the action of strong light on the skin. Cases of toxic action on the kidneys and liver have also been reported but are rare. The authors consider that the drugs have a direct action on the bacteria and recommend a trial of the method in similar cases.

D. Harvey.

Sanfilippo (Emanuele). Sulle complicanze nervose che possono insorgere nel corso della febbre Mediterranea. [**Possible Nervous Complications of Undulant Fever.**]—*Giorn. di Clin. Med.* 1931. May 20. Vol. 12. No. 7. pp. 507–510, 513–514. [18 refs.] [Inst. of Demonstrative Med. Path., Univ., Catania.]

Nervous complications in undulant fever have been reported for many years, such as meningismus with headache, photophobia, even convulsions, also chorea, psychoses, ascending paralysis and peripheral neuritis. Various authors' interpretations of the term "nervous complications" have been so elastic that some (Rousseau, Languet, Wurtz) have stated that they occur in 75 per cent. of patients, whereas others (Cantani, for example) regard them as very rare. The symptoms were usually looked upon as due to toxin. The case recorded is of considerable interest.

A man of 20 years was taken ill at the beginning of May, 1930, with fever and prolonged rigor. After a week the temperature fell, but remained at or about 38° C.; the patient's general state was good and he was able to return to work. Early in July, he had pain in the spine, headache, fever, constipation and occasional vomiting. Physical examination revealed muscular rigidity, marked Kernig's sign, Babinski extensor, exaggerated deep reflexes. Blood and spinal fluid cultures both gave a

growth of *Br. melitensis*; serum agglutinated at 1 : 1,000; W. R. negative with serum and spinal fluid. Treatment by vaccines and urotropin intravenously had no effect, and on September 30th an intrathecal injection of antimelitensis serum (10 cc.) was given and within 24 hours there was relief of headache and spinal pain. After 5 such injections on alternate days, there was marked progress, and the patient left hospital October 26th after 11 days apyrexia. He still showed some paraesthesia of the legs and fleeting pains.

H. H. S.

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## ANDREW BALFOUR MEMORIAL.

*To the Editor of the Tropical Diseases Bulletin.*

Sir,

It has been decided to found a memorial to Sir Andrew Balfour, K.C.M.G., C.B., LL.D., M.D., F.R.C.P., who it will be remembered died in January last, shortly after the opening of the London School of Hygiene and Tropical Medicine, of which he was the first Director.

When funds are available it is intended to place a simple and inexpensive monument in the School, and with the remainder of the sum received to establish an Andrew Balfour Memorial Fund for helping students, preferably from overseas, to pursue courses of study at the School. We feel that Balfour's many friends all over the world would not wish to miss the opportunity of contributing to such a memorial, and we should therefore be grateful if you would kindly allow this letter to appear in your columns. We are confident that even considerations of hard times, heavy taxation or other depressing circumstances will not deter those friends from helping to build up a fund of worthy proportions as a permanent memorial to a magnificent career.

While it is hoped that all who can do so will send a donation in the near future, it is not proposed to limit the period during which the fund will remain open, and promises of donations or bequests will be gratefully acknowledged.

Contributions should be sent to the Honorary Treasurer, Andrew Balfour Memorial Fund, London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.

Yours faithfully,

James Crichton-Browne
James Currie
M. H. G. Fell
W. H. N. Goschen
D. Lyall Grant
W. W. Jameson
P. S. Lelean
Lloyd
Montagu Norman
W. Ormsby-Gore
A. T. Stanton
Henry S. Wellcome
C. M. Wenyon
Reginald Wingate

London School of Hygiene and Tropical Medicine.
January, 1932.

## KALA AZAR.

ADLER (S.) & THEODOR (O.). **Investigations on Mediterranean Kala Azar. I–V.**—*Proc. Roy. Soc.* Ser. B. 1931. Aug. 1. Vol. 108. No. B 759. pp. 447–502.

The investigations described in these papers were carried out at Catania with the support of the Anonymous Bequest Fund of the Royal Society with the object of studying kala azar in the Mediterranean area, particularly with a view to the elucidation of its method of transmission. The first deals with epidemiology, the second with experimental work with the causative organism, *Leishmania infantum*, the third with the distribution and bionomics of sandflies, the fourth with their infection and the fifth with the distribution of sandflies of the *Major* group in relation to the disease.

i. **Introduction and Epidemiology.** pp. 447–453.

Though kala azar is distributed irregularly throughout the Mediterranean basin the three largest foci are at Catania where 150–200 cases occur annually, Naples with 70 cases and Palermo with 70 cases, and their surrounding villages. In the largest foci the human and canine disease always coexist but the ratio of human to canine cases varies considerably in the different areas. The variations are due in the authors' opinion to differences in the bionomics of the insect vectors. Epidemiological studies by JEMMA in Palermo and Naples and by LONGO in Catania have revealed several important features of distribution. In Sicily the disease is prevalent in the coastal regions and is limited by altitude. Of 1424 cases collected by PARADISO none occurred above 733 metres and the majority below 214 metres. Enna and Cesaro at 1,100 metres, though within the endemic area, have no cases. A similar distribution has been noted by PITTALUGA in Spain. In Catania LONGO and his colleagues have shown that the cases occur almost entirely in the periphery of the town. This characteristic has been observed in Naples, Palermo and Spanish foci. As is well known the occurrence of the disease chiefly in young children differentiates it from Indian kala azar. In Sicily about 60 per cent. of the cases occur in infants up to the age of two. The disease is prevalent throughout the year but in Catania is commonest in March and April. The disease in India differs from that of the Mediterranean area in the frequency of family infections, the frequency of house to house infections, the shorter incubation period, its rarity in infants under one year of age and the heavier incidence during epidemic periods. That the Mediterranean disease is not transmitted by the oral route is indicated by its rarity in thickly populated urban slums and its frequence in breast-fed infants. It is concluded that an insect vector must have a bacteriologically sterile intestinal tract since bacterial contamination is fatal to leishmania and must be readily infected since parasites are scanty in the peripheral blood. Evidence is produced to indicate that *Phlebotomus perniciosus* and *P. papatasii* might both be vectors, but the former more so than the latter.

ii. *Leishmania infantum*. pp. 453–463. With 5 figs. on 1 plate & 1 text fig.

Examination of the peripheral blood by the culture method of 36 cases for the presence of parasites gave a positive result in 33. In

22 cultures were obtained when 0·03 cc. of blood was inoculated to the tubes. The development of the parasites in cultures is described and certain features in which it differs from Indian strains are noted. Serologically the Catania strains did not differ from a human and canine strain from Tunis and *L. donovani* of India. Geckos, which had been suspected as a possible reservoir of the parasite, were examined to the number of 51 (49 *Tarentola mauretanica* and 2 *Hemidactylus turcicus*). No leishmania were observed in or cultured from these and inoculation failed to infect a number. The absence of *Leishmania tarentolae* which occurs in geckos in other localities is noteworthy. From 17 of the 49 specimens of *T. mauretanica*, *Trypanosoma ptyodactyli* was cultivated. As *Phlebotomus minutus* occurs in Algeria and Tunis where *Leishmania tarentolae* is found and not in Sicily, it is possible that this sandfly is the vector of the parasite of the gecko. Infections were produced in mice, in the Syrian hamster (*Cricetus auratus*) and in *Microtus güntheri*. A detailed description of the pathology of the disease in these animals is given. Particular attention is drawn to the marked enlargement of the adrenals and the concentration of infected cells round the inter-lobular veins of the liver and their absence from the intra-lobular veins.

iii. **The Sandflies of the Mediterranean Basin. Distribution and Bionomics of Sandflies in Catania and District.** pp. 464–480. With 4 text figs.

This section deals with the characters and habits of the sandflies of the Mediterranean basin. Twenty species or varieties, some of them new, are described and a useful diagnostic table given. There is much valuable information regarding the bionomics of these sandflies, all of which has a direct bearing on the question of kala azar transmission. The commonest species in the Catania district are *Phlebotomus papatasii* and *P. perniciosus*. They are constantly present but their relative frequency varies during the sandfly season. Like the rarer species they are present in greatest numbers at the periphery of the town in the vicinity of stables and gardens. *P. perniciosus* was found to be most frequent during the first 10 days of October. Thus on October 8th over 300 unfed females were observed in the living room of a house in a suburb of Catania. In this house 70 to 80 per cent. of the sandflies caught were *P. perniciosus*.

iv. **Infection of Sandflies with** *Leishmania infantum*. **Natural Parasites of Wild Sandflies in Catania. Observations on** *Trypanosoma ptyodactyli* **Catouillard.** pp. 481–493. With 3 text figs.

Three methods of feeding sandflies on leishmania were used. The flies were allowed to ingest cultures or infected bone marrow through sterile membranes, they were fed on cases of the disease in man or were fed on infected hamsters. The general result was that the parasites develop more readily in *P. perniciosus* and *P. major* than in *P. papatasii* and *P. sergenti*. A small percentage of *P. perniciosus* fed on human cases of kala azar became infected though the number of parasites taken up from the peripheral blood must have been very small. Furthermore the rate of development of *L. infantum* in *P. perniciosus* appears to be more rapid than that described for *L. donovani* in *P. argentipes* in India and *P. chinensis* in China. The infection rate of *P. perniciosus* and *P. papatasii* after

feeding on experimental hamsters with parasites in the corium of the skin was 83·3 and 0·75 per cent. respectively. In one experiment in which 13 *P. major* fed on one hamster 12 became infected. The high infection rate in *P. perniciosus* and *P. major* is considered to show that there exists a specific relationship between these sandflies and *L. infantum*. Fifteen infected *P. perniciosus* were made to feed by Hertig's method which involves the insertion of the proboscis into a fine capillary tube. After feeding the fluid remaining in the tube was examined for flagellates. In 5 cases these were present in small numbers (1–20) but in one several hundred were found. It is evident that the flagellate forms of *L. donovani* are able to leave the proboscis during the feeding act.

As regards the type of flagellate found in infected flies special attention is called to certain short forms with long flagellum which are typical of late stages of infections in sandflies and from their position and behaviour the authors think that they are the forms most likely to enter a vertebrate host.

A Chinese hamster inoculated intraperitoneally with the organisms from infected sandflies became heavily infected. Five mice inoculated subcutaneously and 7 mice intraperitoneally did not become infected. A human being who had previously had and recovered from oriental sore as a result of inoculation with *L. tropica* from infected *P. papatasii* was inoculated in two places in the skin of the leg with *L. infantum* from sandflies. After two weeks two papules appeared at the sites of inoculation but though the papules were still present after more than 4 months repeated examination failed to reveal leishmania. A dog was inoculated in both ears in London with flagellates from two sandflies which had been imported. On arrival the sandflies were dead but the flagellates were still active. Examined 7 months later the bone marrow of the dog revealed no leishmania.

Examination of wild sandflies (3,839 *P. papatasii*, 100 *P. sergenti*, 222 *P. major* and 751 *P. perniciosus*) revealed flagellates of the *L. infantum* type in one *P. perniciosus* taken from a room in which a case of kala azar was sleeping. One female *P. parroti* var. *italicus* showed an infection of crithidia, probably developmental forms of *Trypanosoma ptyodactyli*, which was found in the blood of 17 out of 49 specimens of *Tarentola mauretanica* examined. A few females of *P. papatasii* showed fungi in the alimentary tract, *P. perniciosus* fungi and yeasts in the coelom while nematodes were found in the coelom of five sandflies and ectoparasitic mites on others.

Both *P. papatasii* and *P. parroti* fed on geckos harbouring *Trypanosoma ptyodactyli* became infected with flagellates resembling the crithidia found in the wild fly. The infection was limited to the stomach and cardia, flagellates being attached to the rhabdorium. It is thought probable that the trypanosome is transmitted by the bite of a sandfly, *P. parroti* rather than *P. papatasii*, for in nature the former does but the latter does not feed on geckos.

**v. Distribution of Sandflies of the Major Group in Relation to Mediterranean Kala Azar. Summary and Conclusions. References.** pp. 494–502. [45 refs.]

As a result of the observations described in Sections I–IV the authors concluded that *Phlebotomus perniciosus* is to be considered the

important carrier of kala azar in Sicily. The fact that the ingestion of a small number of parasites produces persisting infection in these sandflies, that the flagellates tend to assume an anterior position and escape during feeding, that the distribution of this sandfly coincides with that of kala azar and that it readily feeds on man are all in favour of this supposition. The local race of *P. major* is also a possible carrier but its distribution is not nearly as wide as that of the disease.

C. M. Wenyon.

NAPIER (L. Everard), assisted by C. R. Das GUPTA. **An Epidemiological Investigation of Kala-Azar in a Rural Area in Bengal.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 295–341. With 12 figs. & 1 map in text. [5 refs.]

The authors describe an epidemiological study of kala azar which they made during the years 1925–1930 in an area 3½ miles long and 2 miles broad with a treatment centre at the village of Kaorapukkur which is itself about 5 miles from Calcutta. Though near the city the conditions were typically rural. There was a population of 5,143 in 1927 and this has undergone no abnormal change since. Of the 5,143, 3,186 were Hindus, 323 Mohammedans and 1,634 Christians. These live in 25 villages with populations varying from 26 to 642. The majority are agricultural labourers in the adjoining rice fields. The economic condition is low but malnutrition when it occurs is usually due to unsuitability of diet rather than to lack of food. Kala azar is endemic in the area and during the observations was in a condition of sub-epidemic exacerbation. Evidence is produced to show that during the six years' study a large percentage of the cases of the disease came under notice. There were diagnosed in all 389 cases. During the second year there was an apparent rise in the incidence but subsequently there was a steady fall, which, when compared with the state of affairs in adjacent areas, seemed to be due to the treatment of infected persons. In about one third of the cases there was a possibility that simultaneous infection of two or more persons had occurred in one house but in a big percentage there was an intervening period of about a year between the cases when more than one occurred in the same house. The incidence in children up to the end of the 12th year was more than double that in adults. This would indicate that children are more susceptible than adults. Again the incidence in villages varied from 0 to 23·65 per cent. of the total population of the area and among Christians it was almost double that among Hindus.

It was shown that infection persisted in the skin of a number of treated persons and the suggestion is made that this cutaneous persistence of parasites may constitute a source of infection during hypo-endemic periods. It may also account for the fact that in households single cases crop up year after year. If this view is correct the incidence of skin infections should be a measure of the kala azar endemicity in any particular area. Households with many occupants were more commonly attacked than those with few. On the other hand in the smaller household there was a greater chance of all its members becoming attacked. In endemic areas in Bengal when a wave of exacerbation of kala azar occurs it is more wide spread but less catastropic than is the disease in Assam. Few villages escape but none

is wiped out. The facts seem to indicate an individual resistance of the majority of the population. As regards the mode of transmission it is not claimed that the observations throw light on the exact method but it is maintained that they can be fitted into the hypothesis that *Phlebotomus argentipes* is the vector of the disease.

C. M. W.

KERMACK (W. O.) & MCKENDRICK (A. G.). **Mathematical Analysis of Dr. Napier's Statistics of House Infection in Kala-Azar.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 343–350. [Royal College of Physicians, Edinburgh.]

A mathematical analysis of the figures relating to household infections obtained by NAPIER in connexion with the observations recorded in the paper reviewed above indicate an intra house infection which is not inconsistent with the assumption of sandfly transmission.

C. M. W.

SHORTT (H. E.), SMITH (R. O. A.), SWAMINATH (C. S.) & KRISHNAN (K. V.). **Transmission of Indian Kala-Azar by the Bite of** *Phlebotomus argentipes.*—*Indian Jl. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1373–1375.

The paper gives an account of an experiment in which 7 hamsters were subjected to the bites of *Phlebotomus argentipes* infected with *Leishmania donovani*. The total number of feeds by sandflies varied from 22 to 149. By dissection of some of the sandflies, as in previous experiments, it was found that at least 2 to 49 infected flies had fed on the animals. The actual number was larger than this for the condition as regards infection of 20 to 101 flies was not known. The duration of the experiment for the 7 hamsters varied from 9 to 17 months. Four of the animals were found dead and no proper examination was possible. In one that was found dead microscopic examination revealed no parasites. The two surviving hamsters on which had fed 144 and 143 sandflies, a large proportion of which, from the results of the examination of samples, must have been infected, were killed on the 511th day from the commencement of infection. In neither was the spleen enlarged but in one the presence of leishmania was demonstrated by microscopic examination and by culture. This is the first occasion on which *Leishmania donovani* has been experimentally transmitted by the bite of a sandfly. [See this *Bulletin*, Vol. 28, p. 639.]

The authors think that the infection rate by the bite of *P. argentipes* may be a low one, for transmission did not occur in the case of 35 other hamsters similarly experimented upon. It is possible that this low rate is dependent upon the fall in virulence of the parasite which appears to run parallel with the passing of the epidemic of kala azar from Assam.

C. M. W.

SHORTT (H. E.), SMITH (R. O. A.) & SWAMINATH (C. S.). **Transmission of Kala-Azar through** *Phlebotomus argentipes* **by the Oral Route.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 351–352.

The paper records experiments in which infection occurred in one of two Chinese hamsters made to eat *Phlebotomus argentipes* infected

by feeding on emulsions of liver and spleen of kala azar animals; while none of three became infected after eating sandflies infected by feeding on cultures.

C. M. W.

Khaw (O. K.). **Transmission of Kala-Azar to Hamsters** (*Cricetulus griseus*) **by feeding them with Infected Carcasses.**—*Nat. Med. Jl. China.* 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 599–616. [30 refs.] [Peiping Union Med. College, Peking.]

Of 10 healthy hamsters which were allowed to feed on the carcasses of experimentally infected hamsters three contracted the infection.

C. M. W.

Hindle (Edward). **The Development of Various Strains of** *Leishmania* **in Chinese Sandflies. (A Report of the Kala Azar Commission of the Royal Society.)**—*Proc. Roy. Soc.* Ser. B. 1931. July 1. Vol. 108. No. B 758. pp. 366–383. [7 refs.]

It has already been shown that the Chinese strain of *Leishmania donovani* develops into the flagellate stage in the stomach of both *Phlebotomus chinensis* (=*P. major* var. *chinensis*) and *P. sergenti* var. *mongolensis* but it is only in the former that the flagellates attach themselves to the lining of the anterior part of the crop and invade the pharynx and buccal cavity. The present paper deals with the development of an Indian strain of *L. donovani*, a Tunis strain of *L. infantum* and a Baghdad strain of *L. tropica* in these flies. These parasites were inoculated from cultures into hamsters but it was only in the case of the first two that generalized infections resulted. In the case of *L. tropica* infection occurred only in the testis and as would be expected sandflies fed on the infected animals showed no trace of development of flagellates. That both the sandflies mentioned would probably be suitable for the development of *Leishmania tropica* into flagellates was indicated by the behaviour in the stomach of cultural forms fed artificially to the flies. In the case of the other two strains generalized infections were produced in hamsters and sandflies of both species fed on them became infected. The flagellates, however, were limited to the stomach and showed no tendency to attach themselves. Furthermore the percentage of sandflies which became infected after feeding was very much lower than was the case when the Chinese strain of *L. donovani* had been employed. The results, which are given in detail in a series of tables, suggest that though there is a general capacity for leishmania to develop into flagellates in the stomach of sandflies it is only when some biological relationship exists between the fly and the particular leishmania used that the flagellates attach themselves and extend into the proboscis. Such a relationship appears to exist between *P. major* var. *chinensis* and Chinese strains of *L. donovani*.

C. M. W.

Nattan-Larrier (L.). Les leishmanioses autochtones en France et la lutte contre leur extension. [**Leishmaniasis in France and Measures to control it.**]—*Bull. Soc. Path. Exot.* 1931. June 10. Vol. 24. No. 6. pp. 447–482. [10 refs.]

The author draws attention to the wide spread nature of kala azar in human beings and dogs in the South of France. In addition to the

cases which have been recorded in the literature and are reviewed in the paper there are many others of which he has knowledge which have not been published. He is of opinion that the disease is extending in France and that the position is more serious than many suppose. On this account he urges a careful enquiry into the whole question. Marcel LEGER in commenting on the paper states that the author is justified in his remarks though it is far from clear in what relation the canine disease stands to that in human beings. In Dakar, for example, where human kala azar is unknown, LAFONT and HECKENROTH in 1914 recorded 5 cases in dogs and he himself in 1922 saw several cases in these animals.

C. M. W.

PAWLOWSKY (E.). Zur Entdeckungsgeschichte der Leishmania-parasiten. [**History of Discovery of Leishmania.**]—*Zent. f. Bakt.* I. Abt. Orig. 1931. Nov. 20. Vol. 123. No. 1/2. pp. 14–19. With 1 text fig. [4 refs.] [Milit. Med. Acad., Leningrad.]

The author presses the claims of BOROWSKY as the discoverer of the parasite of oriental sore. Dr. P. F. BOROWSKY, a young military surgeon, was stationed in Tashkent in 1892 and there, armed with a Zeiss microscope, conducted observations on Sart sores. His results were published in Russian in 1898 in the military medical journal and the author gives a translation of the Russian text and a reproduction of an illustration. It is clear from this that BOROWSKY actually observed the leishmania and noted that they were usually intracellular. They occurred in greater number in the young than in the old sores. The organism is described as spherical or spindle-shaped and having within it a nucleus which not infrequently showed a process passing to the opposite side of the body. On the process a small spherical thickening could be seen. The conclusion is that the parasites on account of the position of the nucleus at the side and the occurrence of flagellum-like outgrowths which were observed in fresh preparations belong to the class Protozoa. It is evident that BOROWSKY was observing the parasite of oriental sore, that in 1898 he gave a recognizable description and illustration of it and that he correctly concluded that it was a protozoon. Though the parasite had previously been seen by CUNNINGHAM in 1885 and by FIRTH in 1891, their descriptions were far from clear.

C. M. W.

GUPTA (C. R. Das). **The Serum-Formalin Proportion in the Aldehyde Test for Kala-Azar.**—*Indian Med. Gaz.* 1931. Sept. Vol. 66. No. 9. pp. 500–502. [6 refs.] [School of Trop. Med., Calcutta.]

As a result of varying the proportion of serum to formalin in the aldehyde test for kala azar a number of fallacious results have been obtained. In order to determine which proportion gave the best results a series of tests with the sera of 56 cases of kala azar was made. It was found that adherence to the rule laid down by the originator of the test should be strictly observed. This consisted in adding one drop of 30 per cent. formalin to 1 cc. of clear serum in a small test tube and mixing by gentle shaking. In order to ensure that clear serum is obtained the procedure of washing out the syringe with normal saline before withdrawing blood may be adopted. The result depends on complete opacity, partial opacity or no change at the end of 24

hours and should be interpreted as positive, doubtful or negative. In strongly positive cases the end result may be read in about half an hour.

C. M. W.

Chopra (R. N.), Chaudhury (S. G.) & De (N. N.). **Changes in the Physical Properties of Kala-Azar Serum with Treatment and its Relation to the Formolgel Reaction.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 423–430. With 22 graphs. [5 refs.] [School of Trop. Med., Calcutta.]

The authors have tested the viscosity of the serum of kala azar cases undergoing treatment with pentavalent antimony compounds. At the same time the rate of occurrence of gelation and complete opacity of serum under the influence of formalin was noted. The results show that the viscosity of sera does not decrease for about two months after treatment has been commenced.

The time of complete opacity begins to increase after about 10 to 15 days whereas the time of gelation increases after about 20 to 30 days. It is suggested that the protein responsible for gel formation is not euglobulin.

C. M. W.

Blacklock (D. B.) & Lourie (E. M.). **The Demonstration of Viable Leishmania in the Faeces of Experimentally Infected Bed-Bugs.**—*Ann. Trop. Med. & Parasit.* 1931. Aug. 13. Vol. 25. No. 2. pp. 359–368. With 1 text fig. [12 refs.] [School of Trop. Med., Liverpool.]

The experiments described were undertaken to discover if living leishmania occurred in the faeces of bed bugs previously fed on cultures. The bugs were fed through mouse skin covering one end of a U-tube filled with culture while viability of leishmania in the faeces was tested by direct microscopical examination or inoculation of culture media. The faeces were collected by allowing the bugs to feed on a cleaned area of the arm of a human subject. In the great majority of cases the faeces of the bug deposited on the skin proved to be bacteriologically sterile. The organisms tested were *Leishmania tropica, L. donovani, L. donovani* var. *infantum, L. braziliensis* and *Herpetomonas culicidarum.* Viable forms of all these were found in the faeces, the longest interval between ingestion of culture and examination of faeces with a positive result being 35 days in the case of *L. tropica.*

C. M. W.

Blanc (Georges) & Caminopétros (J.). Quelques expériences sur la transmission du kala-azar par la tique du chien *Rhipicephalus sanguineus.* [**Experiments on the Transmission of K.A. by the Dog Tick.**]—*C.R. Soc. Biol.* 1931. Sept. 18. Vol. 107. No. 26. pp. 1493–1495. [2 refs.] [Pasteur Inst., Athens.]

The authors record further experiments with dog ticks fed on hamsters (*Citillus citillus*) suffering from experimental kala azar. Larvae of the dog tick were placed on an infected hamster and were removed on the fifth to the eighth day. Ten days later after ecdysis had occurred a batch of the nymphs, as they then were, was emulsified and injected intraperitoneally into ten hamsters. Three months later

five of the animals were killed and one was found heavily infected. Two months later one of the remaining animals died with a heavy infection. Five to six weeks later another died but no infection was found. Another animal died twelve days later, seven months after inoculation, with an intense infection. The two surviving animals were killed two to three months later and were found to be uninfected. A second batch of the nymphs were allowed to fix themselves to five hamsters which were sacrificed after about three months. No infection was found. A third batch of nymphs were allowed to fix on an infected hamster. They were collected from the seventh to the ninth day. Nineteen days later they had moulted and become adults. Twenty were emulsified and inoculated intraperitoneally to five hamsters. Two months later one was sacrificed and found free from infection. About two and a half months later one died but had no infection. Four months later, seven months after inoculation, one of the survivors died with a heavy infection. The two survivors sacrificed later showed no infection.

In another experiment 30 gorged nymphs were removed from a dog suffering from naturally acquired kala azar. An emulsion of the nymphs was made and with it five hamsters were inoculated intraperitoneally. Two died in 13 days without detectable infection. Twelve days later another died without infection. A fourth died just over four months from the time of inoculation and the fifth about five weeks later. Both these animals had a massive infection.

The authors note that from these results it is evident that hamsters inoculated as described may develop an infection slowly so that examination after two or three months may not reveal an infection which is developing. Furthermore parasites will survive in ticks for at least 21 days even though ecdysis occurs during the interval.

C. M. W.

SAHA (B.). **Treatment of Kala-azar by 25 per cent. Aqueous Solution of Sodium Antimony Tartarate and Resumé of Other Non-Intravenous Methods.**—*Calcutta Med. Jl.* 1931. Mar. Vol. 25. No. 9. pp 335–338.

The author having noted in the British Journal of Children's Diseases (1930) the report of a case of infantile kala azar from Egypt successfully treated with rectal injections of tartar emetic, has tried the treatment in 5 cases and found it satisfactory. The method used is very simple. The rectum is washed out with tepid normal saline. Then 2 cc. of a 0·25 per cent. solution of sodium antimony tartrate is injected. Injections are given every second day, the dose being increased on each occasion by 2 cc. till 8 cc. is reached. Injections are then given every fourth day, the dose being again increased by 1 cc. till 12 cc. is reached. In children up to 2 to 3 years of age 12 cc. was the maximum dose but in a girl 10 years of age this was increased to 24 cc. In 4 cases the average duration of treatment was 2 months and the average number of injections 18. The treatment caused no rectal irritation and antimony was demonstrated in the urine by Reinsch's method two days after administration of a dose. In one case, a boy of 2, amoebic dysentery developed during the antimony treatment. This was interrupted and emetine administered. After recovery from the dysentery tartar emetic treatment was resumed and a cure resulted.

The author has also tried intramuscular injections of tartar emetic and hyperacid antimony tartrate in cases in which, for one reason or another, it was not possible to give intravenous injections. The former is very painful and often leads to abscess formation. On the other hand the latter, though painful, has not caused suppuration. The symptoms may be relieved by the use of hot compresses for half an hour after injection and at 8-hourly intervals for the next two days.

C. M. W.

Brahmachari (Phanindranath) & Brahmachari (Upendranath). **The Intensive Antimonial Treatment of Kala-Azar.**—*Jl. Trop. Med. & Hyg.* 1931. Aug. 15. Vol. 34. No. 16. pp. 263–264. [2 refs.] [Brahmachari Research Inst., Calcutta.]

The authors point out that one of them (U.N.B.) in 1925 described a series of cases of kala azar which had been successfully treated with urea stibamine administered daily or on alternate days or several times a day during a period of thirty-six hours to seven days. Since then records of a series of 125 cases in which intensive treatment with urea stibamine was successfully carried out have been kept. It is noted that with this drug intensive treatment gives as good results as those obtained with any other antimonial but it has to be remembered that certain cases even early ones are resistant ; to this reference will be made in a later paper. In the intensive treatment of adults extending over six to nine days the daily dose of urea stibamine given intravenously varied from 0·025 to 0·2 gram.

C. M. W.

Kundu (Saratsashi). **A Note on the Control of Kala-Azar in Assam by Urea Stibamine.**—*Indian Jl. Med.* 1931. Aug. Vol. 12. Pt. 4. pp. 168–171.

The author, who has been in touch with kala azar work in Assam since 1917, states that up to 1920 segregation of infected persons, evacuation of sites and houses and burning of huts and clothes were the only possible methods adoptable to prevent the spread of the disease. Owing to the hardships inflicted by these methods there was an ever-increasing tendency on the part of the population to conceal cases. In 1920 the efficacy of tartar emetic treatment was widely circulated and during this and the following five years increasing numbers came for injections. The figures for the six years were 7,118, 15,880, 19,659, 35,071, 48,770 and 60,940. Though the percentage of deaths during this period was reduced from 39·3 to 10·4 matters were not entirely satisfactory owing to the long course of treatment necessary and the reluctance of many patients to complete the course. Then urea stibamine was introduced by Brahmachari and gave a greater certainty of cure in a much shorter time. In 1925 it took the place of tartar emetic and it is assumed that the increase in numbers for that year was due to the popularity of the new treatment. In the following three years, 1926–1928, the numbers declined as follows :—49,355, 33,475 and 23,579. Similarly the death rate fell from 10·4 in 1925 to 8·9, 8·6 and 7·0. If the author's conclusions are correct, the good result obtained was due to the introduction of urea stibamine, but he does not consider the possibility of any natural rise and fall in the incidence of the disease.

C. M. W.

Shanks (G.) & De (M. N.). **Studies in the Histology of the Spleen, Bone, Marrow and Liver in Cases with Splenomegaly, with Special Reference to those due to Kala-Azar. (1) The Connective Tissue and Reticulum.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 457–468. With 5 figs. (1 coloured) on 3 plates. [10 refs.]

The paper deals exclusively with the liver and spleen from a series of 31 cases of splenomegaly, 26 of which were due to kala azar. In 80 per cent. of the proved cases of kala azar the spleen showed no increase of fibrous tissue or reticulum. This was true also of 70 per cent. of the livers. It is concluded that fibrosis of the spleen and cirrhosis of the liver cannot be considered regular features of kala azar itself.

C. M. W.

Row (R.). **Agglutination in Leishmaniasis.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 641–655. With 3 figs. on 1 plate. [33 refs.] [Grant Med. College, Bombay.]

The author has shown that with an appropriate antigen the phenomenon of agglutination can be observed with the sera from cases of kala azar. The antigen giving this result is prepared as follows. A four-day culture of leishmania on the surface of solidified haemoglobin [see this *Bulletin*, Vol. 28, p. 155] is gathered in a loop and shaken up with 2 cc. of a 0·85 per cent. solution of sodium chloride. When the suspension is quite homogeneous and uniform it is submitted to a temperature of 55·5° C. for one hour and then left at 22° C. for 24 hours or more to let the heavier flagellates settle. The supernatant fluid is then found to be of uniform opalescence. This is the standard antigen which keeps for over a month. The test is carried out by mixing in capillary pipettes equal quantities of antigen and serum diluted 1 in 30. At the end of two hours examination with a lens will reveal granule formation. The granules become visible to the naked eye in three hours and by four hours have produced a deposit. The reaction is a group one for it occurs with antigen made from the parasite of oriental sore. Sera from cases of this disease, however, do not give good agglutination.

C. M. W.

Messik (K. E.). Zur Frage ueber normale Trombozytobarine in bezug auf Leishmanien. [**Thrombocytobarins in Normal Blood in Reference to Leishmania.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. June. Vol. 35. No. 6. pp. 334–336. [6 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

It has been stated by Chodukin and Sofieff working in Middle Asia and also by Burowa from the same district that the serum of normal laboratory animals not infrequently contained thrombocytobarin which gave a positive adhesion reaction with leishmania. This led Burowa to assert that when applied to laboratory animals as a test of infection with leishmania the reaction was of no value. The author accordingly decided to test the sera of animals in Moscow where serological changes which might result from the bites of infected

sandflies could not occur. The test was carried out with 30 mice, 8 dogs and 8 rabbits with the result that all were negative except 4 of the mice. Two canine strains gave a strongly positive reaction, while a strain of *Leishmania tropica* was weakly positive. The author does not accept BUROWA's assertion that the degree of the reaction is sufficient to indicate that *Leishmania donovani* and *L. tropica* are genetically distinct nor does he hold that the occasional occurrence of thrombocytobarin in normal animals renders the test useless.

C. M. W.

NAPIER (L. Everard) & HENDERSON (J. M.). **The Erythrocyte Sedimentation Rate in Kala-Azar.**—*Indian Jl. Med. Res.* 1931. Oct. Vol. 19. No. 2. pp. 691–699. With 4 charts in text. [School of Trop. Med., Calcutta.]

The conclusion reached is that the sedimentation rate though probably greater in kala azar than in any other disease is unlikely to prove of any practical value in diagnosis or as an indication of the progress of treatment.

C. M. W.

KUROTCHKIN (T. J.). **An Attempt to immunise Hamsters against Kala Azar.**—*Nat. Med. Jl. China.* 1931. Aug.-Oct. Vol. 17. No. 4/5. pp. 458–463. [6 refs.] [Peiping Union Med. College, Peking.]

It was found that apart from certain individuals which are naturally resistant to infection susceptibility of hamsters to kala azar is absolute in that infection may occur even when very few parasites are injected. Vaccines prepared from flagellate and non-flagellate forms of leishmania did not protect animals against infection but tended to render them even more susceptible to inoculation.

C. M. W.

WIGMORE (J. B. A.) & CAMERON (W. M.). **Two Cases of Infantile Kala-Azar.**—*Jl. Roy. Army Med. Corps.* 1931. June. Vol. 56. No. 6. pp. 449–453. With 1 text fig. [6 refs.]

The paper gives the history of two children aged 5 and $2\frac{3}{4}$ years belonging to one family which came to Egypt from Malta in December 1928. The younger child, a boy, was admitted to hospital in May 1930 suffering from general malaise and debility with occasional evening pyrexia. There was found to be enlarged liver and spleen associated with a mildly febrile condition and a blood picture of mild anaemia with definite lymphocytosis and large mononuclear increase but no abnormal cells or leucocytosis. The boy's sister was found to have a similar condition. Spleen puncture performed on the boy revealed numerous leishmania. Both children were treated with fouadin, but as there was no improvement they were invalided to the United Kingdom. It was concluded on account of the extreme rarity of kala azar in Egypt that the disease had been contracted in Malta and had remained latent during the 18 months in Egypt.

C. M. W.

Plazy, Germain & Marcandier. Un cas de kala-azar méditerranéen chez l'adulte observé à Toulon. [**Case of K.A. in an Adult at Toulon.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. July 20. Year 47. 3rd Ser. No. 25. pp. 1332–1337. [14 refs.]

The case recorded is that of a man 36 years of age who contracted kala azar at Toulon where he had lived continuously for the past five years. Though the disease in children is known in Toulon a case in an adult has not hitherto been noted. The discovery of leishmania was not made till after death though kala azar was suspected towards the end when cancrum oris developed. The nature of the disease was obscured by the presence in the blood of *Plasmodium vivax* and by ascites. Death was directly due to a severe intestinal haemorrhage. A re-examination of blood films made during life revealed a few leishmania.

C. M. W.

Olmer (Jean). Kala-azar de l'adulte. [**K.A. in an Adult.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. Oct. 19. Year 47. 3rd Ser. No. 26. pp. 1506–1510. [Refs. in footnotes.]

Record of a case of kala azar in a young man who contracted the disease in Marseilles. A puncture of the much enlarged spleen having failed to reveal leishmania splenectomy was performed. Death resulted from haemorrhage and at post-mortem numerous leishmania were found in the spleen and liver. Though kala azar in children is quite common in Marseilles this appears to be the first case in an adult.

C. M. W.

Lereboullet (P.), Chabrun (J.) & Baize (P.). Un cas de kala-azar infantile observé à Paris. [**Case of Infantile K.A. seen in Paris.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. June 8. Year 47. 3rd Ser. No. 19. pp. 932–936. With 3 text figs. [1 ref.]

The case described is that of a child five years of age which contracted the disease on the Mediterranean coast of France. A complete cure was obtained by intramuscular injections of stibional which contains 0·018 gm. of antimony per cubic centimeter. The child received 27 injections representing a total of 86 centigrams of antimony. The formol gel reaction was carried out and the authors emphasize its importance in giving an indication of progress during treatment.

C. M. W.

Benhamou (Ed.), Gille (R.) & Nouchy (A.). Kala azar de l'adulte suivi de guérison. [**K.A. in an Adult. Recovery.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1931. May 25. Year 47. 3rd Ser. No. 17. pp. 884–892. With 2 figs. [Refs. in footnotes.]

The case reported is that of a woman 28 years of age in Algeria. A cure was effected by three 8-day courses of neostibosan the dose being 0·3 gm. a day given intravenously. Prior to the institution of specific treatment a detailed study of the blood was carried out and the results obtained with the albumin and globulin contents are in agreement with those of Lloyd, Napier and Paul working in Calcutta [see this *Bulletin*, Vol. 26, p. 744].

C. M. W.

Sorge (Giuseppe). Ancora sul Kala-azar giovanile nostrano. [**K.A. in Young Adults in Sicily.**]—Reprinted from *Minerva Med.* 1931. Apr. 14. Year 22. Vol. 1. No. 15. 12 pp. With 1 chart. [Med. Clinic, Catania.]

In a previous note the author described 4 cases of kala azar in adults, which had been seen at the clinic in Catania between April and July 1929,

and expressed the opinion that the disease in adults was more common than had been suspected. In the present paper two further cases are recorded, both in young women, one 21 years of age and the other 16.

C. M. W.

CAMMARATA (Antonio). Contributo alla cura del kala-azar. [**Case of K.A. Recovery.**]—*Riv. Sanitaria Siciliana.* 1931. Apr. 15. Vol. 19. No. 8. pp. 594–595.

A case of kala azar in a child four years of age from Caltanissetta, Sicily. A cure was obtained by 12 intramuscular injections of stibonal, the doses varying from 0·25 to 1·5 cc. given at intervals of 5 days.

C. M. W.

CH'ENG (Chang Chi). **Cutaneous Amoebiasis resulting from a Ruptured Liver Abscess Coincident with Kala-Azar. Report of a Case.**—*China Med. Jl.* 1931. Apr. Vol. 45. No. 4. pp. 350–352.

The case described is one of kala azar complicated by amoebic abscess of the liver which ruptured through the abdominal wall producing a large area of ulceration in the discharge from which both *Entamoeba histolytica* and *Leishmania donovani* were found. The patient received injections of emetine and neostam while the wound was irrigated with eusol 3 times a day. In spite of an attack of pneumonic symptoms, which interrupted the course of neostam for a time, a good recovery was made.

C. M. W.

CHUNG (Hui-Lan). **An Early Case of Kala-Azar, possibly an Oral Infection in the Laboratory.**—*Nat. Med. Jl. China.* 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 617–621. [11 refs.] [Peiping Union Med. College, Peking.]

The case recorded is that of a young Chinese medical man who contracted kala azar after doing laboratory work involving the frequent handling of blood from squirrels suffering from the disease. On many occasions through neglect of precautions infective blood was taken into the mouth and it seems not improbable that the infection was acquired orally.

C. M. W.

ROTON & MESNARD. Un cas de kala-azar infantile observé à Saigon. [**Case of Infantile K.A. seen at Saigon.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1931. July–Aug. Vol. 9. No. 7. pp. 511–515. With 1 text fig. & 1 folding chart.

This is the second case of kala azar to be observed in Tonking. In both cases the disease was acquired elsewhere, the first in China and the second on the south coast of France.

C. M. W.

CHODUKIN (N. J.), SOFIEFF (M. S.), SCHEVTSCHENKO (F. J.) & RADSIVILOVSKIJ (G. L.). Phlebotomus als Ueberträger von Hunde-Leishmaniose. [**Phlebotomus as Vector of Canine Leishmaniasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. July. Vol. 35. No. 7. pp. 424–434. With 2 text figs. [Uzbekistan San. Bact. Inst., & Military Vet. Labs., Tashkent.]

The authors describe attempts which they made in 1928 and 1929 to transmit leishmaniasis from dog to dog by allowing *Phlebotomus papatasii* to feed on the margins of sores on naturally infected dogs and then on healthy ones. None of these experiments succeeded. In 1930 the method of experimentation was modified. A dog with cutaneous lesions was placed in a flyproof cage but separated from contact with four healthy puppies which were in the same cage. All animals were carefully cleared of fleas before introduction. From

May 15 to August 15 wild sandflies, chiefly *P. papatasii* and *P. sergenti*, were introduced. Counts made from time to time showed that 30 to 70 flies were present on the gauze walls of the cage. In July two of the puppies died without showing any sign of infection but at the beginning of October one of the remaining puppies was seen to be suffering from an infiltration on the snout. A few days later the other puppy died without leishmania infection. On the same day the animal with the nasal swelling was examined. A small ulcer and three areas of infiltration were found. Smears from the granulations revealed large numbers of leishmania. Bone marrow obtained by trephining of the tibia revealed no parasites. Though it is admitted that the experiment leaves certain points undetermined it is concluded that it demonstrates that leishmaniasis is transmitted from dog to dog by sandflies.

C. M. W.

Machattie (C.) & Mills (E. A.) in collaboration with Chadwick (C. R.). **Naturally Occurring Oriental Sore of the Domestic Cat in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Aug. 8. Vol. 25. No. 2. pp. 103–106. With 6 figs. on 1 plate. [3 refs.]

The authors, who have shown that oriental sore is of common occurrence in dogs in Baghdad and have also reported it in bears which were kept there in captivity, now describe the disease in two cats. The lesions occurred on the nose, eyelid and ear. An attempt to inoculate mice in the tail failed though strains from the dog similarly inoculated to mice produced a local infection in the tail with the presence of parasites in the spleen and bone marrow. The character of the lesions, the parasites from them and the cultural forms are shown in a series of photographs.

C. M. W.

Arias Aranda (Carlos) & Rosa (A.). Existen localizaciones óseas en la leishmaniosis americana? [**Bone Lesions in American Leishmaniasis.**]—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 460–465. With 5 text figs. [Mission for the Study of Argentine Regional Pathology, Jujuy.]

By means of X-ray photographs the authors have been able to demonstrate that cutaneous ulcers due to leishmania are liable to produce a condition of osteitis in the bones which lie beneath them.

C. M. W.

Mazza (Salvador) & Arias Aranda (Carlos). Ensayos de tratamiento de la leishmaniosis americana por la "Fuadina". [**American Leishmaniasis treated with Fouadin.**]—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 449–459. With 11 text figs.

—— & ——. Fuadinversuche bei der amerikanischen Leishmaniose.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Oct. Vol. 35. No. 10. pp. 583–591. With 11 text figs. [Mission for the Study of Argentine Regional Pathology, Jujuy.]

The paper gives an account of 3 cases of muco-cutaneous leishmaniasis which were successfully treated in the Argentine with intramuscular

injections of Fouadin. The rapidity with which healing of the lesions of the mucous membranes took place was remarkable. The two adults received 1·5 cc. and 3·5 cc. for the first two injections, subsequent doses being 5 cc. These caused neither pain nor local disturbance. One patient received 32 injections during two months and six days and the other 10 injections in hospital and 7 further ones at home. The remaining case was in a child nine years of age. Treatment with intravenous stibosan was given at first but was replaced by Fouadin of which two courses of 10 intramuscular injections were given, the maximum dose being 3·5 cc.

C. M. W.

WARMA (J. D.). **Oriental Sore.**—*Indian Med. Gaz.* 1931. July. Vol. 66. No. 7. pp. 383–388.

In the treatment of oriental sore, of which the author has had considerable experience in the Punjab, he has had good results with carbon dioxide snow but considers that the best results are obtained by local injections of berberine sulphate solution. He considers that if the sore shows signs of sepsis or acute inflammation these should be treated before specific treatment is instituted.

C. M. W.

FERRADAS (Manuel G.) & TOSCANO (Juan M.). Un caso de leishmaniosis cutanea y visceral. [**Case of Leishmaniasis both Dermal and Visceral.**] —*Medicina Países Cálidos.* Madrid. 1931. July. Vol. 4. No. 4. pp. 327–332. With 2 figs. & 1 chart in text. French summary (4 lines).

The case is that of a child who was admitted to the antimalaria dispensary at Camporredondo in Spain on account of suspicious symptoms noted during the taking of a spleen index of an infant population. Puncture of the enlarged spleen revealed leishmania. On the left cheek there was a scar said to be the result of a sore which had commenced as a spot nine months before. It reached the size of a five centime piece, was covered by a dark scab and was surrounded by an inflamed area. It lasted about 3 months. Coincidentally with the healing of the sore the child, who had been in good general health, became ill and its abdomen enlarged. After discovery of leishmania in the spleen treatment with neostibosan was commenced. During treatment the tissues round the scar on the cheek became inflamed but this reaction subsided in a short time. It is concluded from the history of the sore on the cheek that it was leishmanial in nature, and that the child had suffered from both oriental sore and kala azar.

C. M. W.

SINDERSON (H. C.). **Lupus vulgaris and Oriental Sore.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 75–76. With 1 plate.

The author describes a case of oriental sore in which cicatrization occurred, but was complicated by the appearance in the scar, particularly at its periphery, of nodules of lupus vulgaris. A photograph illustrates the condition of the lesion on the left cheek and nose of the patient, who was a boy aged 10 years. A secondary tuberculide is fairly common amongst young children in Baghdad and mention is made of one family in which 4 out of 5 children suffered from oriental sore complicated by lupus vulgaris. The author has not seen the condition in an adult nor in a European child.

C. M. W.

DE CASTRO (A. Bayley). **Notes on Oriental Sore.**—*Indian Med. Gaz.* 1931. July. Vol. 66. No. 7. pp. 391–392. [Military Families' Hosp., Hyderabad.]

The author records the good results he has obtained in the treatment of nine cases of oriental sore by local infiltration of the sores with a 1 per cent. solution of berberine sulphate.

C. M. W.

COLONIEU (L.). Sur un cas de boutons d'Orient multiples contractés dans l'Atlas marocain. [**Case of Multiple Oriental Sores contracted in Morocco.**]—*Arch. Inst. Pasteur d'Algérie.* 1931. Mar. Vol. 9. No. 1. pp. 13–14. With 1 plate.

The record of a case of oriental sore in which five distinct lesions occurred. It is the first case to be recorded from the district of Azilal in Morocco.

C. M. W.

ARTAMONOV (A. S.). [**Case of Leishmaniasis of the Mucous Membrane.**]—*Trop. Med. & Vet.* Moscow. 1930. Vol. 8. No. 10. pp. 1–2. With 2 figs. [In Russian.]

The author describes a case of leishmaniasis observed in a native of Turkestan. The lower lip was swollen and its mucous membrane covered with numerous minute purulent ulcers; an examination of the material taken from these revealed leishmania. The forehead bore marks of healed oriental sore.

C. A. Hoare.

MAZZA (Salvador) & DE LOS RÍOS (Miguel). Leishmaniosis oriental de forma no común observada en Jujuy. [**Dermal Leishmaniasis seen in the Argentine.**]—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 445–448. With 1 text fig. & 1 coloured plate.

A case of oriental sore in a Lebanon Syrian, who had a typical lesion on the bridge of the nose when seen nine months after the commencement of the disease as a small vesicle during the voyage from Algiers to the Argentine.

C. M. W.

BORREGO (Camilo) & CAMPO POSADA (Arturo). Leishmaniosis cutanea de formas ulcerosa simple y nodular-ulcerosa. [**Case of Dermal Leishmaniasis both Ulcerative and Nodular.**]—*Rev. Méd. Colombia.* Bogotá. 1931. July. Vol. 1. No. 12. pp. 791–797. With 3 text figs.

The paper describes a case of cutaneous leishmaniasis in Colombia in which there were several lesions, some of the simple ulcerative type and others of the nodular type. Treatment was successful with intramuscular injections of Fouadin in doses of 5 cc.

C. M. W.

CHAILLOT (L.) & SAUNIE (L.). Observation d'un cas de leishmaniose canine cutanée rappelant le bouton d'Orient. [**Case of Canine Leishmaniasis recalling Oriental Sore.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 535–538. [6 refs.]

The case referred to was one of a dog which had been imported to Beirut from France two years before. When seen by the author it was suffering

from ulceration of both ears. Microscopical examination of smears of the exudate revealed abundant leishmania.

C. M. W.

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Brosius (O. T.). Dermal Leishmaniasis.—*Nineteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1930. pp. 107–108. [United Fruit Company Hosp., Almirante, Panama.]

Croveri (Paolo). La leishmaniosi infantile in Piemonte. Un nuovo caso osservato in Torino.—*Arch. Ital. Sci. Med. Colon.* 1931. June 1. Vol. 12. No. 6. pp. 326–335. With 1 text fig. [3 refs.] English summary (7 lines). [General Med. Clinic, Univ., Turin.]

Mazza (Salvador) & Arias Aranda (Carlos). Formas verrucosas de leishmaniosis americana.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 470–475. With 6 text figs. [Mission for the Study of Argentine Regional Pathology, Jujuy.]

Pascal (J. M.). Sur l'existence du bouton d'Orient à Ouargla.—*Arch. Inst. Pasteur d'Algérie.* 1931. Mar. Vol. 9. No. 1. pp. 15–16. [4 refs.] [Pasteur Inst. of Algeria, Algiers.]

Poma (Carlos S.). Sobre un caso de leishmania americana del ingenio Concepción de Tucumán.—*6a Reunión Soc. Argentina Patol. Regional del Norte, Salta, 29 y 30 septiembre y 1 octubre, 1930.* pp. 466–469. With 2 text figs.

Willoughby (Hugh) & Aslett (Edward). The Symptomatology, Differential Diagnosis and Treatment of Kala-Azar.—*Jl. Roy. Nav. Med. Serv.* 1931. July. Vol. 17. No. 3. pp. 189–194. With 2 charts in text.

## MEDICAL ZOOLOGY.

Reichenow (E.). Die pathogenetische Bedeutung der Darmprotozoen des Menschen. [**The Pathogenous Significance of the Intestinal Protozoa of Man.**]—*Zent. f. Bakt.* I. Abt. Orig. 1931. Vol. 122. No. 1/3. Beiheft. pp. 195*–212*. [28 refs.]

A general reviewal of present knowledge of the subject, from which the author concludes that hitherto no species of flagellates and, except *Entamoeba histolytica*, no species of amoebae has been really proved to be pathogenous. Many pathological states of the intestine encourage settlement of some of these species, and it is quite possible—but none the less not certainly known—that their mass-proliferation might affect the course of the malady unfavourably. Even *E. histolytica* for the most part is harmless and usually becomes virulent and a tissue parasite under predisposing conditions that affect the host as a rule in warm climates. Of other intestinal protozoa that infest man *Balantidium coli* and certain Coccidia are pathogenous, but the former may live in the human gut, as it does in the swine, without injury to the host and must require some predisposing or contributory condition in the host to become a tissue parasite ; and Isospora, as in the case of laboratory infection described by Connal, may come and pass away without any symptoms of disease.

A. Alcock.

Labbé (Marcel), Nepveux (F.) & Nichita. Les parasites intestinaux dans la pathologie du tube digestif. [**Intestinal Parasites in the Pathology of the Digestive Tube.**]—*Arch. des Malad. de l'Appareil Digestif.* 1931. Apr. Vol. 21. No. 4. pp. 401–425. [23 refs.]

There is nothing entirely novel either in the statistics of stool examinations, or in the nature of the inferences from them, that are set forth in this paper. The authors, of their own experience, confirm the opinion that the mere discovery of parasites in a stool does not necessarily justify immoderate exaggeration, yet are convinced of the pathogenic significance of intestinal parasites—protozoa and helminthes —when their presence in the stools is carefully correlated with the history and course of clinical observation of gastro-intestinal complaints. They are convinced, in short, that, with this stipulation, energetic treatment of parasitic infestations of the intestine can considerably reduce infantile mortality and adult morbidity. The protozoon and helminth parasites specified in the statistics here reported and cited are those which a profusion of evidence has now made familiar.

A. A.

Hakki (Ismail). Examen parasitologique des selles en Turquie. [**Intestinal Parasites in Turkey.**]—*Rev. Méd. et Hyg. Trop.* 1931. May–June. Vol. 23. No. 3. pp. 127–129. [1 ref.]

The results of examination of stools from 800 individuals in Constantinople and various districts of Turkey are as follows :—Protozoa : *Entamoeba coli* cysts in 6·25 per cent. ; *E. dysenteriae* cysts, 3·75 ; *Chilomastix mesnili*, 2·5 ; *Trichomonas intestinalis* 4·37 ; *Giardia intestinalis*, 7·5. Neither Coccidia nor Balantidium.

*Blastocystis hominis*, 8·75 per cent. No spirochaetes.

Eggs of Helminthes: *Hymenolepis nana*, 3·12 per cent.; *Diphyllobothrium latum*, 6·25; *Dipylidium caninum*, 0·62; *Fasciola hepatica*, 0·62; *Dicrocoelium dendricum*, 1·25; *Ascaris lumbricoides*, 18·75; *Enterobius vermicularis*, 22·5; *Necator americanus*, 3·75; *Ancylostoma duodenale*, 0·62; *Strongyloides stercoralis*, 2·5; *Trichuris trichiura*, 22·5. *Taenia saginata* has frequently and *T. solium* has rarely been observed.

The stools were from children above 5 years and adults, some healthy, but the majority with nervous or digestive trouble.

A. A.

GUILLINY (R.). Le parasitisme intestinal dans la province de Vahomandry (Madagascar). [**Intestinal Parasites in the Province of Vahomandry (Madagascar).**]—*Marseille-Méd.* 1931. Jan. 25. Vol. 68. No. 3. pp. 124–128.

Struck with the frightful native anaemia prevalent in the province of Vahomandry the author set to work to examine the stools of the people—men, women, and children of all ages. Here are the results seen in 227 stools (after concentration).

Hookworm, either Ancylostoma or Necator, in every one. Ascaris in 175. Whipworm in 196. Threadworm in 7. Strongyloides in 2. *Schistosoma mansoni* in 64. Taenia in 3. *Entamoeba coli* cysts in 32. Giardia cysts in 7. Trichomonas in 1. Quadruple infestations in 60; triple in 107; double in 43; quintuple in 12. Even native children less than two years old had intestinal parasites, and even European children of no long residence. In six of the stools a common food-mite, Tyroglyphus, was present.

A. A.

TSUCHIYA (H.). **Incidence of Protozoan Infections of Intestinal Tract among Children in Saint Louis.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Apr. Vol. 28. No. 7. pp. 709–710. [Med. School, Washington Univ., St. Louis, Mo.]

A comparison of incidence of protozoan infections among 362 white children in different states of environment and health, namely (*a*) 164 healthy inmates of two orphanages, (*b*) 156 inmates of convalescent homes, and (*c*) 42 sufferers from various acute maladies. The incidence was highest in one of the two (*a*), and lowest in (*c*). Of the whole 362 children 33 per cent. were infected with one, 10 per cent. with two and 3 per cent. with three species. The ages of the children ranged from 1 to 16 years, and infection was highest in those of 7 to 9 years and lowest between 1 and 3 years, and higher among boys than girls. The incidence of *Giardia lamblia* was highest; of *Trichomonas hominis* lowest.

A. A.

THOMSON (J. Gordon). **The Question of Immunity in Man to Protozoal Diseases.**—*Proc. Roy. Soc. Med.* 1931. Feb. Vol. 24. No. 4. pp. 499–510. (Sect. Trop. Dis. & Parasit. pp. 9–20). With 1 chart in text. [1 page of refs.]

This is a valuable epitome, with solid foundations and fortification in bibliography, of the modern Pilgrim's Progress towards light for

them that still sit in darkness on the subject of man's resistance to four protozoal diseases—malaria, trypanosomiasis, kala azar and amoebiasis. Being a digest of recorded fact it cannot be summarized to any advantage, and its purport can be shown in the author's own conclusions.

[It is evident, from the discussion that followed the address, that a statement got afloat that the great LIVINGSTONE was immune to malaria. LIVINGSTONE, himself an M.D., writes in his book on *Missionary Travels and Researches in South Africa* (1861) p. 332 [after his twenty-seventh attack] : " It is true that I suffered severely from fever . . . compelled to sleep on the damp ground month after month, exposed to drenching showers, and getting the lower extremities wetted two or three times a day, living on manioc roots and meal, and exposed during many hours each day to the direct rays of the sun with the thermometer standing above 96° in the shade." His first attack of " fever " (in 1853) is described in p. 132, as due to " malaria and watery vapour."]

" *Conclusions.*—(1) In the four protozoal diseases of man briefly discussed, namely, malaria, trypanosomiasis, kala-azar and amoebiasis, there is definite evidence of a natural resistance to infection. Some individuals may be completely refractory to an infection, but the most common type of immunity seems to be a natural tolerance associated with the presence of parasites in small numbers.

" (2) This resistance or natural tolerance may from various causes be completely broken down. The first acute manifestations of an infection often date from some cause which lowers the general body resistance.

" (3) A definite acquired immunity or more correctly an acquired tolerance depending on the presence of parasites in small numbers can be brought about by continuous and repeated infections as is well illustrated in malaria and trypanosomiasis and to a less extent in leishmaniasis and amoebiasis. Again, this acquired immunity can be easily broken down if reinfection is interrupted for a considerable period. Any debilitating cause may also bring about loss of resistance.

" (4) Little is known of the characters of natural or acquired immune bodies. Natural immunity depends upon some unknown properties in the normal serum, and from recent observations of Yorke, Adams and Murgatroyd would seem to be dependant on such factors as diet. These immune substances become less or disappear from the serum in certain pathological conditions of the body.

" (5) In acquired immunity, on the other hand, antibodies of an unknown nature seem undoubtedly to be formed, but these are either unstable or quickly eliminated from the body after complete disappearance of the parasites. In other words, this acquired immunity seems to depend to a large extent on the continued presence of a low infection with parasites. It seems further, to depend upon more or less continued inoculation with fresh strains of parasites and if this continued inoculation is interrupted for a considerable period the immunity is broken down. Any debilitating cause can also bring about loss of resistance.

" (6) Practical methods of passively immunizing man are at present of little value. The use of vaccines or antisera in treatment requires further observations.

" (7) It would seem, however, that the important observations already made on natural resistance and acquired immunity to these infections open up a hopeful field to research workers, because, if one could find the factors or biochemical properties influencing refractoriness to infection, it might be possible to protect individuals either completely from infection or from the ravages of acute infestation."

A. A.

RATCLIFFE (Herbert L.). **Di-Hydranol (2-4-Dihydroxyphenyl N-Heptane) in the Treatment of Infections with Intestinal Protozoa.**—*Amer. Jl. Trop. Med.* 1931. July. Vol. 11. No. 4. pp. 285–292. [6 refs.] [Med. School, Univ. of Pennsylvania, & Lab. of Comparative Path., Zool. Soc., Philadelphia.]

The author advances dihydranol as promising "to be an effective non-toxic remedy that can be used in treating flagellate, amoebic or ciliate infections with a high degree of success". He mentions cases in which it was used by FAUST, with success against *E. histolytica* and some other infestations, but not always against *E. coli*, Chilomastix, and Giardia, and also cases reported by DAVID and LEAKE in which 0·6 gm. per kilo. of body-weight was fatal for guineapig. In his own experiments, using a solution in olive oil, and a suspension in friable agar blocks, the drug was "effective in clearing up infections with pathogenic amoebae and ciliates in monkeys, and in ridding man and monkeys of intestinal protozoa of lesser importance". Dosage for monkeys ranged from 3·5 to 6 gm. and for man 9 to 15 gm.

A. A.

i. TANABE (Misao), KUWABARA (Naonori) & CHIBA (Eiichi). **On the Cultivation of *Entamoeba coli* in Tanabe and Chiba's Medium.**—*Keijo Jl. of Med.* 1930. May 20. Vol. 1. No. 2. pp. 91–93 (21–23). [4 refs.]

ii. CHIBA (Eiichi) & KUWABARA (Naonori). **On the Pathogenicity of *Entamoeba histolytica* cultivated in Tanabe and Chiba's Medium.**—*Ibid.* pp. 94–98 (24–28). [15 refs.] [Parasit. Dept., Keijo Imperial Univ., Chosen, Japan.]

i. In Tanabe and Chiba's medium two strains of *Entamoeba coli* grew luxuriantly, persisting as long as 12 days; the strains have been maintained for 168 and 170 generations. The amoebae encysted in it and the cysts hatched in it quite easily.

ii. Six strains of *E. histolytica* from acute dysentery stools grown in Tanabe and Chiba's medium, and regularly subcultured in it for 15 to 202 days, demonstrated infectivity and typical pathogenic results for kittens. The authors therefore conclude that ingestion of rice-starch by *E. histolytica* does not inhibit pathogenicity.

Tanabe and Chiba's medium is made as follows: Agar slants (10 gm. agar, 1 gm. asparagin, 1,000 cc. Ringer solution) are covered with Ringer solution containing 5 per cent. rabbit serum, or with a mixture of 8 parts Ringer solution and 1 part horse serum; before insemination 2 or 3 loopfuls of sterilized (160°–180° C.) rice starch are added to the liquid part of the medium.

A. A.

KOCH (Dorothy Ann). **Infection with Craigia. Report of Case.**—*California & Western Med.* 1931. Apr. Vol. 34. No. 4. pp. 277–278. With 2 text figs. [4 refs.] [Pacific Inst. of Trop. Med., Univ. of California, San Francisco.]

During routine examination of faeces from a patient in hospital organisms identified as belonging to the genus *Craigia* were discovered on a single occasion in films which had been stained. The organism figured has an

average diameter of 6·6 microns, possesses a nucleus with large irregularly shaped karyosome and vacuolated cytoplasm containing a few deeply staining granules. It is stated that many forms showed a blepharoplast but in none was a flagellum seen. In the absence of a flagellum the identification of a granule as a blepharoplast must be open to question. The figures show nothing which could be so identified ; they bear a striking resemblance to *Endolimax nana*. The evidence on which the diagnosis is based is so slender that the paper can hardly be regarded as contributing to our knowledge of *Craigia*.

C. M. Wenyon.

Nuzum (Franklin R.), Elliot (Albert H.) & Priest (Blanche V.). **Flagellate *Trichomonas hominis* in the Rabbit—its Pathogenicity. Report of an Instance of Infestation in Man, with Necropsy Findings. Report of Case.**—*California & Western Med.* 1931. July. Vol. 35. No. 1. pp. 19–21. [26 refs.] [Cottage Hosp., Santa Barbara.]

The authors are acquainted with what has been written about *Trichomonas hominis*, and they describe their experiments with rabbits, in some of which the animals undoubtedly became infected with this parasite and showed after death solely minute superficial ulceration in the rectum ; but they could not find any evidence of tissue-invasion by the parasite. They also describe a case in a constipated male child (white) of 2 years and 10 months with a previous history of muco-sanguineous dysentery and fever, a present condition of fever, weakness and heavy *T. hominis* infestation, a clinical diagnosis of " septicaemia, secondary anaemia, chronic tonsillitis, otitis media ", and a long list of post-mortem phenomena none of which (except, possibily, numerous peculiar small brownish-pink spots on the serosa of the large gut) suggested the intervention of the Trichomonas. The authors are " forced to conclude that *Trichomonas hominis* is not pathogenic in the rabbit " ; and they state, furthermore, that careful post-mortem study of the child warrants them " in reporting the absence of any evidence of tissue-invasion " by the parasite. Nuzum's personal opinion is " that *Trichomonas hominis*, at least in most instances, is nonpathogenic for man."

A. A.

McClendon (S. J.). **Giardiasis in Children. Report of Cases.**—*California & Western Med.* 1931. Apr. Vol. 34. No. 4. pp. 266–268. [10 refs.] [Rees-Stealy Clinic, San Diego.]

Experience of 22 cases of Giardia infection (in the course of routine examinations) in children from 2 to 15 years old has convinced the author that the organism is pathogenous. Besides such immediate symptoms as abdominal pain and tenderness, nausea, flatulence, and constipation the author notes anorexia, nervous irritability, languor, headaches, and enuresis ; and only one instance of diarrhoea. Treatment consists of a ten day's course of bismuth-salicylate followed in a week by a ten days' course of treparsol—this whole course to be repeated (if necessary to the fourth time) at a weekly interval between courses.

A. A.

Faust (Ernest Carroll). **Habitat of Giardia in the Intestine.**—*Proc. Soc. Experim. Biol. & Med.* 1931. Mar. Vol. 28. No. 6. pp. 621–623. [4 refs.] [Dept. of Trop. Med., Tulane Univ., New Orleans.]

It is customary, even among those who speak with authority, to talk of Giardia as seated in the upper part of the small intestine, mainly in the duodenum. Dr. Faust draws attention to the seats of *Giardia canis* in the intestine of the dog. In the majority of natural dog-infestations the prime seat of this organism (*G. canis*) is in the caecum and appendix; frequently it is also present in the colon and the rectum, occasionally in the last 10 cm. of the ileum, never in the higher levels of the intestine.

A. A.

Taliaferro (William H.), Cannon (Paul R.) & Goodloe (Sara). **The Resistance of Rats to Infection with *Trypanosoma lewisi* as affected by Splenectomy.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 1–37. With 3 text figs. [26 refs.] [Dept. of Hyg. & Bact., & Path. Dept., Univ., Chicago.]

This is a very special investigation, the object of which is to discover whether or not the specific antibody that in the authors' opinion inhibits the proliferation of the parasite in rats infested with *T. lewisi* is formed chiefly in the spleen. The effects of splenectomy under various experimental conditions are studied and recorded in detail. The main conclusion is that splenectomy does not markedly influence the formation of this specific antibody in young healthy rats when the operation is performed at intervals from 7 days before to 41 days after infection provided the animals are free from Bartonella infection and certain other disturbing or disabling conditions mentioned. Infection with *T. lewisi* in Bartonella-free rats does however, cause a significant increase in size of spleen with a demonstrable increase in cellular activity.

A. A.

Jírovec (Otto). Ueber das Vorkommen von blepharoplastlosen Trypanosomen in normalen Stämmen. [**Occurrence of Trypanosomes without Blepharoplasts in Normal Strains.**]—*Zent. f. Bakt.* I. Abt. Orig. 1931. May 28. Vol. 121. No. 1/2. pp. 55–58. [6 refs.] [Inst. for Ship & Trop. Hyg., Hamburg.]

The observations here recorded confirm the fact that individuals devoid of blepharoplast are found in all kinds of trypanosomes even in stocks long cultivated in laboratory animals. The percentage of such individuals varies from host to host, and often quite irregularly in the course of an infection.

A. A.

Huff (Clay G.). **The Inheritance of Natural Immunity to *Plasmodium cathemerium* in Two Species of Culex.**—*Jl. Preventive Med.* 1931. July. Vol. 5. No. 4. pp. 249–259. With 2 text figs. [7 refs.] [Dept. of Hyg. & Bact., Univ., Chicago.]

In earlier papers on this subject (see this *Bulletin*, Vol. 27, p. 892, and Vol. 28, p. 507) the author described his experimental procedure and results showing that for *Culex pipiens* and *C. quinquefasciatus* susceptibility and insusceptibility to bird-malaria (*Plasmodium cathemerium*) were inheritable characters within the species, since selection from the progeny from females susceptible to that infection tended to increase and selection from the progeny from non-susceptible females tended to decrease the percentage of susceptible individuals in the succeeding generations. In the present paper, these observations

are confirmed and a genealogical table of *Culex pipiens* is given diagrammatically in which susceptibility to *P. cathemerium* is explained as a Mendelian recessive character.

A. A.

Bovet (Daniel). La durée du cycle schizogonique du *Plasmodium praecox*. [**The Duration of the Schizogonic Cycle of** *Plasmodium praecox*.]—*C.R. Soc. Biol.* 1930. Nov. 4. Vol. 105. No. 29. pp. 302–304. With 1 graph in text. [5 refs.]

Canaries were infected with a strain of *P. praecox* originally obtained in 1902 by the Sergents and subsequently maintained in canaries and *Culex pipiens*. It has been the subject of numerous researches under the name of *P. relictum*. The blood of the canaries was examined every three hours over a period of 50 hours, and it was found that there was a regular cycle of 12 hours duration, whereas the cycle of *P. cathemerium*, another bird parasite, lasts 24 hours. The escape of the merozoites into the blood is not accompanied by fever, such as occurs in human malaria.

W. Fletcher.

Green (Richard T. B.). **A Malarial Parasite of** *Macacus cynomolgus* **and its Development in Mosquitoes. (Preliminary Note.)**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Apr. 25. Vol. 24. No. 6. pp. 649–650. [Inst. for Med. Research, Kuala Lumpur, F.M.S.]

This malaria parasite, discovered by McSwan in the Malay *Macacus cynomolgus* (2 individuals), has some resemblance to *Plasmodium vivax*. "In certain features it corresponds with descriptions of *Plasmodium kochi* of African monkeys (Cercopithecus) and in others with those of *P. inui* in Borneo monkeys (Macacus)." Inoculated from monkey to monkey, pyrexia occurred on the 3rd or 4th day; small rings in the blood on the 5th or 6th day, large trophozoites and young gametocytes on the 7th or 8th day, fully developed gametocytes on the 8th or 9th day; and the spleen became palpable from the 9th to the 13th day. Few symptoms beyond pyrexia and anaemia are shown in *M. cynomolgus*, and although the blood remains infected for months the animals do not seem to lose condition. The monkey-lice were free from infection.

*Anopheles maculatus* Theob. and *A. kochi* Don. took the infection (sporozoites), also *A. vagus* Don. (only oocysts so far). (Infection experiments with *Culex quinquefasciatus*, *Armigeres obturbans*, and *Stegomyia albopicta* were constantly negative). Large oocysts were observed in one *A. kochi* 9 days after the infective feed. In appearance and rate of growth oocysts were indistinguishable from those of *P. vivax*. Sporozoites were plentiful in the salivary glands by the 16th day; they could not be distinguished from those of the human malaria parasites—a warning to those who find Anopheles naturally infected.

A. A.

Little (C. J. H.). **A Note on** *Balantidium coli*.—*Jl. Roy. Army Med. Corps.* 1931. Apr. Vol. 56. No. 4. pp. 298–299.

The purport here is to illustrate by deliberate experiment the rapid degeneration of *Balantidium coli* in a standing stool in India, the temperature of the laboratory being 80° F. and the atmosphere moist.

A stool brought for examination about an hour after it had been passed was found to be swarming with active forms of this parasite. When the stool had been kept for another hour a second cover slip preparation was made from it ; in this delayed preparation only a few sluggish parasites could be found surviving at one spot, the others being represented by ghostly vacuoles some of which contained disintegrated remains. The experiment, as the author thinks, may justify the opinion that balantidiasis may often be overlooked.

A. A.

Picon (Raul R.). L'infection par l'*Hemogregarina hominis*. [**Case of *H. hominis* Infection.**]—*Rev. Sud.-Américaine de Méd. et de Chirurg.* Paris. 1931. May. Vol. 2. No. 5. pp. 495–501. With 1 text fig. & 2 coloured figs. on 1 plate. [Faculty of Med., Lima.]

This paper, illustrated with a text figure and coloured plate, deals with an organism seen in a blood film during life and subsequently in large numbers in sections and smears of the liver and spleen post mortem in a patient in Peru. The organism, which is regarded as a haemogregarine, occurs in a variety of forms ; some are pear shaped with a single small red staining dot, others are ovoid while yet again others are filamentous and measure 20 to 30 microns in length by 3 to 5 microns in breadth. The long forms have several red staining dots. Though the organism does not bear the slightest resemblance to any known haemogregarine it is identified with Krempf's " Haemogregarina hominis " which similarly had nothing in common with these parasites. It is fortunate that the paper is so well illustrated for it enables the reviewer to state with certainty that the organism is of a vegetable nature.

C. M. Wenyon.

Buxton (Patrick A.). **The Measurement and Control of Atmospheric Humidity in Relation to Entomological Problems.**—*Bull. Entom. Res.* 1931. Sept. Vol. 22. Pt. 3. pp. 431–447. With 9 text figs. [23 refs.] [School of Hyg. & Trop. Med., London.]

This is a discourse on the measurement and control of humidity under set conditions in experimental entomology. It is partly descriptive of hygrometers and hygroscopic substances and solutions, and partly commentative and illustrative of their varied employment and efficiency. It includes much that is common knowledge in physics but is thought to be insufficiently appreciated in biology. It concludes with a valuable list of works on the measurement of humidity and of reports and studies on the influence of relative humidity on the vitality of particular insects of experiment. As the author states, it is not a paper that can be summarized.

A. A.

Smith (Roger C.). **A Study of Temperature and Humidity Conditions in Common Types of Insect Rearing Cages.**—*Jl. Agric. Res.* 1931. Sept. 15. Vol. 43. No. 6. pp. 547–557. With 1 fig. [7 refs.]

This paper, which consists mainly of description and discussion of methods and apparatus for the study of insects in enclosed spaces

under controlled conditions of humidity, is too severely technical to be summarized. It has a page of illustrations of a dew-point apparatus, a psychrometer of original design, and other instruments convenient for determining relative humidity within insect-cages, and also a list of references to useful literature under this heading.

A. A.

Buxton (P. A.). **The Law governing the Loss of Water from an Insect.**— Reprinted from *Proc. Entom. Soc. London.* 1931. July 10. Vol. 6. Pt. 1. pp. 27–31. With 2 text figs. [6 refs.]

Dealing with experimental work on insects in the laboratory the author reminds us of the important difference between " relative humidity " and " saturation-deficiency " ; that, other things equal, the rate of evaporation from an open surface is almost directly proportional to the saturation-deficiency ; and that this " law," subject to certain modifications, applies to mammals and to leaves of plants. He would like to know whether it applies also to insects with their chitinous protection, and from analysis of the records of some other writers on the subject of insects exposed to a range of combinations of temperature and humidity he concludes that " the law of saturation-deficiency applies, within certain temperature limits, both to eggs and to adult insects of several different orders." The author quotes among others, Bacot and Martin who showed that the duration of life of adult *xenopsylla cheopis* was directly proportional to saturation-deficiency in a number of experiments conducted at one temperature, but at different conditions of humidity ; but that at very high humidities the proportion broke down.

A. A.

Hoeppli (R.) & Feng (L. C.). **Histological Reactions in the Skin due to Ecto-Parasites :** *Dermacentor sinicus* **P. Schulze from Hedgehog,** *Haemaphysalis campanulata hoeppliana* **P. Schulze from Dog,** *Cimex lectularius* **and** *Pediculus vestimenti* **from Man.**—*Nat. Med. Jl. China.* 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 541–556. With 8 figs. (2 coloured) on 4 plates. [15 refs.] [Peiping Union Med. College, Peking.]

Histological changes seen in the skin of laboratory animals (guinea-pig, etc.) removed after suffering the close attentions of the two species of ticks named above (and stained with haematoxylin-eosine) seem to have been as follows :—

The tissue all around the site of the tick's beak was characteristically transformed into a homogeneous eosinophile clot or mass irregularly permeating interstices in the corium ; this mass was subsequently invaded by wandering cells, and ultimately (in one clear case) ended in a certain amount of necrosis ; smaller similar masses or clots were sometimes found blocking the small neighbouring blood-vessels ; beyond this the corium and perhaps the subcutaneous tissue was infiltrated with polymorphs, eosinophiles, and various other altered cells.

Subcutaneous injection of emulsions of salivary glands of these ticks caused more extensive local hyperaemia, oedema, and cell-infiltration, but the homogeneous eosinophile masses were never observed.

Subcutaneous injection of emulsions of both kinds of the salivary glands both of bed-bugs and of body-lice caused no appreciable histological changes in skin of laboratory animals ; but in three human beings the implantation of the bean-shaped salivary glands of the louse in the skin resulted in an inflammatory papule, consisting of a small circumscribed vascular granulomatous mass of cells, with much perivascular cell-infiltration in the surrounding tissue ; and in each case this local inflammation was con-

current with a malady that suggested " either a kind of atypical Trench Fever or an infection nearly related to it."

Much of the minutiae of the text is trivial rather than astonishing, but the well-executed plates of figures are helpful and valuable.

A. A.

Mukerji (S.). **" Lacto-Chloral " : a New Clearing and Mounting Medium for the Rapid Observations of the Microscopical Structures of Small Insects.**—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 281–283. [7 refs.]

The author prescribes lacto-chloral above lactophenol as a clearing and mounting medium for microscopic examination of small insects. It is made of the following ingredients, mixed in the order given : chloral hydrate 0·5 gm., distilled water 1 cc., glycerine 1 cc., lactic acid *puriss.* 2 cc., glacial acetic acid 2 to 4 minims, formol 0·5 cc. Neither heating nor filtering is necessary, and it is as well to make fresh medium as required. A drop of the medium is placed in the hollow of a slide. The object is dropped into this drop and a cover-slip is applied. If the clearing, etc., is satisfactory (20 minutes) the preparation can be sealed for permanence.

A. A.

British Mosquito Control Institute. **Report of the Director** [Marshall (J. F.)]. **Presented at the Fourth Annual General Meeting, held in the Rooms of the Entomological Society of London, 41 Queen's Gate, London, S.W., on the 9th December, 1930.**—16 pp. With 30 figs. Hayling Island, Hampshire, England.

The British Mosquito Control Institute is now a Corporation for " the furtherance of research and educational work in relation to the control of mosquitoes and other insects." Scientific Societies, Educational Bodies, Local Authorities, Clubs and other Associations may become " Collective " Members. This report, which is finely illustrated, describes some of the researches that have been published during the last few years, and gives some account of its educational work and methods and apparatus at home and of its lectures and demonstrations at scientific meetings in various other places.

A. A.

Bath (C. H.). **The Practical and Research Value of Mosquito Traps.**—*Amer. Jl. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 147–150. [Gorgas Memorial Lab., Panama.]

According to this author Sir Ronald Ross, in his book " Mosquito Brigades and How to Organize Them ", was the first to use the term " mosquito-trap " to a combination of a sleeping man and a mosquito-net with some rents in it : the man acts as a bait and the mosquitoes getting in at the rents cannot get out again. Ross, however, did not follow up with a mosquito-trap baited with a man : in his book " The Prevention of Malaria " the mosquito-trap mentioned is a box lined with black cloth.

In the author's mosquito-trap the man is used as a bait, but he doesn't get bitten because he sleeps under a sound mosquito-net inside a mosquito-house the screens of which have valvular slits that

allow mosquitoes to creep into the mosquito-house but obstruct their escape. (Or the slit may open into a special inlet or entry having a narrowed outlet to the house). "In Miraflores the three largest catches made in one night" with a trap on these principles "were 1018; 473; and 414, all Anopheles" and "the total number of Anopheles counted in sixty days from six traps was 37,000". Elsewhere there resulted "a total catch of 49,496 *Anopheles* in the eleven traps in use in thirty-two days", and "the largest catch made in one trap in one night was 4,973 *Anopheles*."

"It is a good anti-malarial measure, since nearly all *Anopheles* that are attracted into the traps are females in search of a blood-meal with which to develop her eggs . . . I believe that mosquito traps [on these principles] will eventually be built into houses as an essential part of the screening on dwellings in unsanitated areas."

A. A.

SPEER (Alma Jane). **Compendium of the Parasites of Mosquitoes (Culicidae).**—*Hyg. Lab. Bull. No. 146.* Wash. 1927. Mar. pp. iv+36.

This useful compendium of the parasites of mosquitoes includes, of course, not only parasites pathogenous to those insects but also the parasites transmitted by them to other animals, and the term "parasite" includes forms like Vorticella which take independent root on many freshwater organisms besides mosquito larvae, and catch their own food from the watery environment. The compendium with explanatory detail, fills 35½ pages, five of which contain a generic list, in biological precedence, of the parasites reported from mosquitoes, while twenty-nine are occupied by a list of the species of mosquitoes affected, with the parasites reported from each species.

A. A.

SHANNON (Raymond C.). **The Environment and Behavior of Some Brazilian Mosquitoes.**—*Proc. Entom. Soc. Washington.* 1931. Jan. Vol. 33. No. 1. pp. 1–27. [16 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

This is a very interesting account of the mosquitoes of the middle coast states (Bahia northwards to Rio Grande do Norte). A list of 86 species is given (compared with 188 in all Brazil and 550 in all America) and the larval habits of all but 7 of them are known. The 86 species include 15 anophelines, and among them the recently introduced common African species *Anopheles gambiae* (=*costalis*) which the author regards as almost vying with *Aëdes aegypti* and *Culex 5-fasciatus* (=*fatigans*) in its intimate association with urban man. The list is followed by some comprehensive and well-informed considerations of mosquito environment and behaviour in nature and also as affected by Man. There is a very full account of *Aëdes aegypti*, and as illustrating the argument that it is essentially urban, the author states that when colonies of about 3,000 eggs and larvae and pupae were planted in wooded localities 3 kilometers distant from houses, adults were never seen in these rustic localities after the lapse of 2 weeks.

A. A.

Senevet (G.). Contribution à l'étude des nymphes de Culicides. Description de celles de certains anophélinés et plus spécialement des espèces européennes et méditerranéennes. [**Contribution to the Study of Nymphs of Culicidae. Description of those of Some Anophelines and Especially of European and Mediterranean Species.**]—*Arch. Inst. Pasteur d'Algérie.* 1930. Sept.–Dec. Vol. 8. No. 3/4. pp. 297–382. With 48 text figs. [Pasteur Inst. of Algeria, Algiers.]

Authors generally, with a few recent exceptions, have disregarded the characteristic chaetotaxy in attempting the taxonomy of mosquitoes in the pupal stage. The author has carefully studied the disposition of the abdominal setae and spines, segment by segment, from the paddles forwards, in the pupae of 23 species of Anopheles and here sets forth and generalizes the results in descriptions and large clear text-figures with two provisional keys, one for the discrimination of 12 European and Mediterranean species, the other including 30 species in a wider distribution.

A. A.

Senevet (G.). Contribution à l'étude des nymphes d'anophélinés (2e mémoire). [**Contribution to the Study of Anopheline Nymphs. Part 2.**]—*Arch. Inst. Pasteur d' Algérie.* 1931. Mar. Vol. 9. No. 1. pp. 17–112. With 57 text figs. [5 refs.] [Pasteur Inst. of Algeria & Faculty of Med., Algiers.]

Tabulated detail of the specific superficial characters of 22 species and 3 varieties, along with a provisional key for the determination of anopheline nymphs, and 57 text figures. The author points out that 4 species described by Root (*Amer. Jl. Hyg.* 1926, Vol. 6, p. 684) were inadvertently omitted from Part I of his descriptive catalogue.

A. A.

Davis (Gordon E.) & Philip (Cornelius B.). **The Identification of the Blood-Meal in West African Mosquitoes by Means of the Precipitin Test. A Preliminary Report.**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 130–141. [17 refs.] [Yellow Fever Labs., Internat. Health Division, Rockefeller Foundation, Lagos.]

This paper contains a short account of the precipitin test and the authors' technique and statistics of results in its application to the identification of the blood ingested by large numbers of West African mosquitoes of 26 species. Two common house-haunting species *Mansonia africanus* and *Anopheles gambiae* were positive for human blood only—the first in 195 of 210 tests, the second in 154 of 188. Of 8 species of Aëdes tested all were occasionally positive for human blood. The other species sometimes found positive for human blood were *Anopheles funestus, A. pharoensis, Culex grahami* group, and *C. thalassius.* The common *Culex nebulosus* was positive for chicken blood only in 38 of 54 tests. " It is significant that no cross-reactions were observed."

A. A.

Matheson (Robert) & Hinman (E. H.). **Further Work on Chara spp. and Other Biological Notes on Culicidae (Mosquitoes).**—*Amer. Jl. Hyg.* 1931. July. Vol. 14. No. 1. pp. 99–108. [5 refs.] [New York State College of Agric., Cornell Univ., Ithaca.]

Experiments with *Chara vulgaris* and other local species. From observations here described the authors conclude that it is the effect of continuous bombardment by the tiny bubbles of oxygen discharged

by Chara that makes life impossible for the mosquito larva. The larvae can live to maturity with Chara grown in darkness, but not at all with Chara growing in sunlight. This bombardment can be effected mechanically, in water free from Chara, by forcing the stream of bubbles through reversed Berkefeld candles. The authors are satisfied that Chara is not "toxic." Incidentally they noticed Hydra capturing mosquito larvae.

A. A.

Wigglesworth (V. B.). **The Formation of the Peritrophic Membrane in Insects, with Special Reference to the Larvae of Mosquitoes.**—Reprinted from *Quarterly Jl. Microscop. Sci.* 1930. May. Vol. 73. Pt. 4. pp. 593–616. With 10 text figs. [25 refs.]

This interesting entomological paper, which is liberally illustrated by instructive figures in the text, describes the formation of the peritrophic membrane in the larvae of mosquitoes, and traces how it is formed in the same general way in other Diptera and in most of the main orders of insects that have been examined. In all chitin formed the basis of the peritrophic membrane.

A. A.

Hecht (Otto). Ueber den Wärmesinn der Stechmücken bei der Eiablage. [**The Temperature-Sense of Parturient Mosquitoes.**]—*Riv. di Malariologia.* 1930. Nov.–Dec. Vol. 9. No. 6. pp. 706–724. With 3 text figs. [13 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

In the deposit of its eggs the temperature of the water in the author's experiments was for *Anopheles maculipennis* never above 32°–34° C., seldom under 20° C., exceptionally under 15° C.; for *A. bifurcatus* 12°–20° C.; and for *Aëdes aegypti* between 20° and 30° C.

A. A.

Hamlyn-Harris (R.). **Mosquitos breeding in Tree Cavities in Queensland.**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 51–52. [Health Dept., Brisbane City Council, Brisbane.]

Two lists of local trees (both indigenous and exotic) in which rot-holes occur; in one list mosquitoes have been found breeding in the holes, in the other not. Unless the suitable tree is growing near dwelling places *Aëdes argenteus* and *Culex fatigans* do not use it. In the bush the mosquito that commonly uses tree-holes is *Ae. notoscriptus*.

A. A.

Legendre (J.). Le moustique cavernicole ou l'adaptation de "Culex pipiens" à l'urbanisme moderne. [**The Cave-Mosquito; or the Adaptation of** *Culex pipiens* **to Urban Life.**]—*Bull. Acad. Méd.* 1931. Year 95. 3rd Ser. Vol. 106. No. 28. pp. 86–89.

In certain quarters of a certain city in the west of France that are annually infested by mosquitoes (*C. pipiens*) these insects do not breed much in the waters of the park among the little fishes, but in stagnant pools in certain dark caves, and in underground cisterns and cesspools.

A. A.

Magrou (J.), Magrou (M.) & Roubaud (E.). Action stimulante à distance, exercée par certaines suspensions bactériennes, à travers le quartz, sur l'éclosion du moustique de la fièvre jaune. [**The Stimulating Action exercised at a Distance by Certain Bacterial Suspensions, across Quartz, on the Hatching of the Yellow Fever Mosquito.**]—*C.R. Acad. Sci.* 1931. May 4. Vol. 192. No. 18. pp. 1134–1136. [2 refs.]

It is well known that eggs of *Aëdes aegypti* containing larvae ready to hatch, may remain dormant for long periods in the absence of certain stimuli [see this *Bulletin*, Vol. 27, p. 497]. The authors have made the very interesting observation that 24 hour cultures of *B. tumefaciens*, or 8 hour cultures of *Staphylococcus aureus*, will produce the hatching of the larvae when separated from the water containing the ripe eggs, by means of a quartz plate. The emanations from the cultures of *B. tumefaciens* caused 31 out of 194 eggs to hatch in 24 to 48 hours, whilst out of 203 eggs kept as controls at the same temperature none hatched. Similarly, out of 78 eggs exposed to the emanations from *Staphylococcus* 7 hatched in 24 hours, whilst of 69 eggs kept as controls none hatched. Moreover, eggs that did not hatch after exposure to these emanations were more susceptible to other stimuli than normal eggs, as a higher percentage of them hatched when they were subsequently slightly shaken. When the quartz plate was replaced by glass the cultures also had a slight stimulating effect on the hatching of eggs, but to a much less degree than when quartz was used.

E. Hindle.

Philip (Cornelius B.). **Supplemental Note regarding Mosquito Vectors of Experimental Yellow Fever.**—*Science.* 1930. Dec. 5. Vol. 72. No. 1875. p. 578. [3 refs.]

Some time ago an authority on those insects identified mosquitoes that *rightly* should have been named *Aëdes* (*Stegomyia*) *albopictus*, *wrongly* as *Aëdes* (*Stegomyia*) *scutellaris*; consequently the specific name *Scutellaris* took precedence, the name *albopictus* lapsed from use, and for some time two distinct species of the subgenus Stegomyia were labelled under the same specific name "scutellaris." In time, the mistake was discovered, the species *albopictus* was recognized and its name lawfully restored to proper and correct use as that of a species different from *scutellaris*. But in the meantime confusion had occurred from the two different species having been called by the same name. The author draws attention to an instance of this unhappy confusion that might have occurred when two different parties, namely: (*a*) Dinger, Schüffner and others (*Nederl. Tijdschr. v. Geneesk.*, Dec. 1929, No. 51, p. 5982); and (*b*) de Vogel (see this *Bulletin*, Vol. 27, p. 486), were testing some species of Stegomyia with regard to their susceptibility to the infection of yellow fever. Both parties used the same species of Stegomyia, and both parties found it more or less susceptible: but one party called it quite rightly *Aëdes* (*Stegomyia*) *albopictus*, and the other party, unaware of any impropriety, called it quite wrongly *Aëdes* (*Stegomyia*) *scutellaris*.

The author does not say that any inconvenience *has* happened from this confusion, so far; but he may be pardoned for drawing attention to the iniquity of using bad names for insects, even when they are detected in bad leanings.

A. A.

PHILIP (Cornelius B.). **List of Mosquitoes collected in Nigeria, West Africa, Incidental to Research on Yellow Fever.**—*Proc. Entom. Soc. Washington.* 1931. Feb. Vol. 33. No. 2. pp. 44–47. [3 refs.]

From this list of West African mosquitoes we take the names of the following species there stated to be implicated in the transmission of the infection of yellow fever :—*Stegomyia aegypti, S. simpsoni, S. africana, S. luteocephala, S. vittata, Aedimorphus stokesi* (=*apiciargentea*), and *Mansonioides africanus.* [The first is the only proved natural vector]

A. A.

SHANNON (Raymond C.). **On the Classification of Brazilian Culicidae with Special Reference to those capable of harboring the Yellow Fever Virus.**—*Proc. Entom. Soc. Washington.* 1931. June. Vol. 33. No. 6. pp. 125–164. With 7 plates. [17 refs]. [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

Most of this is taxonomy, but taxonomy animated with ecological salt and harbingered by philosophical discourse. The items that engage our particular attention are the two following :—

1. Experiments in the Bahia laboratory during two years indicate that the Brazil mosquitoes capable of harbouring the yellow fever virus for terms longer than the usual incubation in "stegomyia" all belong to the genera Psorophora, Aëdes, and Mansonia, all of which "feed primarily on mammalian blood." Possibly Haemagogus, being akin to Aëdes, may be susceptible. Deinocerites of the crab-holes attacks man freely, but being derived directly from Culex, is unlikely. *Culex quinquefasciatus* [=*fatigans*] has been discovered "to be at least a highly unfavourable host."

[These observations are in accord with those made in Nigeria, at Lagos, where successful transmission of yellow fever by biting was obtained "with a number of species of Aëdes . . . and with *Mansonia africanus.*" There too *Eretmopodites chrysogaster* was proved to be "a favourable host", and *Culex thalassius* was infected, "after an adequate incubation period", by injection].

2. From a study of the American species the author is inclined to separate Stethomyia from Anopheles as a very distinct genus.

A. A.

KUMM (Henry W.). **Studies on *Aëdes* Larvae in South-Western Nigeria and in the Vicinity of Kano.**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 65–74. With 8 text figs. [12 refs.]

Descriptive entomology. This paper deals with the Aëdes larvae commonly found in Nigeria. It gives a key for the identification of the species, a comparison of their diagnostic characters, a list of the breeding-places—pots, rock-holes, rot-holes, crab-holes, bamboo-stumps, pools—where the different species have been found, and diagnosis of three species. It is well supplemented with figures in the text.

A. A.

CHOWDHURY (K. L.). **Some Observations on the Hibernation and 'Wintering' of Anophelines in the Punjab.**—*Records of the Malaria Survey of India.* 1931. Sept. Vol. 2. No. 3. pp. 407–421.

These observations of the wintering of certain Indian anophelines were made at Karnal [lat. about 29° N., long. about 76° 30′ E.] in the Punjab and relate to *A. fuliginosus, culicifacies, subpictus, stephensi, listoni, hyrcanus* var. *nigerrimus, barbirostris, pallidus, pulcherrimus, maculipalpis* var. *indiensis, maculatus,* and *gigas.*

Of the first seven, *subpictus* alone seems to be a true hibernating species, probably as an adult; its larvae cannot be found in the winter; in the laboratory the adults die quickly with the coming of cold nights in December; its eggs, if laid on water, hatch when the temperature is below 50° F. (but the resulting larvae die young) and when kept on moist earth for a test of viability at the end of winter "have given negative results". *Fuliginosus, culicifacies, stephensi, listoni, hyrcanus,* and *barbirostris* have been found, both larvae and adults—the adults with fresh blood in them—throughout the winter; but their winter numbers are much reduced by death among adults on the approach of cool nights, and by retarded growth (and increased mortality) of larvae, since larval growth takes place in winter only if the daily maximum air-temperature rises above 70° F.; calculating from the length of their pre-adult and adult stages in winter, it would appear that the winter season must be bridged (ovum to ovum) in a single cycle. Of *pallidus, pulcherrimus,* and *maculipalpis* the author obtained in winter only active adults but not any larvae of *maculipalpis.* Six larvae of *A. gigas* were found in a well in February.

A. A.

CHRISTOPHERS (S. R.) & BARRAUD (P. J.). **The Eggs of Indian Anopheles, with Descriptions of the hitherto Undescribed Eggs of a Number of Species.**—*Records of the Malaria Survey of India.* 1931. Mar. Vol. 2. No. 1. pp. 161–192. With 33 figs. on 5 plates. [39 refs.]

By its nature, this paper cannot be summarized to any good purpose, although a word of appreciation of its merits cannot be withheld. It comprises (1) a statement of accounts of other writers on eggs of Indian species and a list of references to the publications of those authors, as well as to publications dealing with eggs of species of other countries. (2) an account of the authors' technique; a description of the Anopheles egg in particular detail; a tabulated logical classification of all known Anopheles eggs according to the authors' method of discrimination; a synoptic arrangement of the eggs (so far as they are known) of all Indian species, according to their distinctive markings; and a brief description of the egg of each such species, with a sufficient accompaniment of good clear figures.

A. A.

CHRISTOPHERS (S. R.). **Studies on the Anopheline Fauna of India. (Parts I-IV.)**—*Records of the Malaria Survey of India.* 1931. June. Vol. 2. No. 2. pp. 305–332. With 3 maps. [24 refs.] [Central Research Inst., Kasauli.]

Notes on anophelines of Kashmir, of N.W. India, and on varieties of *A. gigas, A. lindesaii,* and *A. maculatus.*

A. A.

Strickland (C.) & Chowdhury (K. L.). **The Anopheline Larvae of the Countries from India and the Orient to the Antipodes. A Supplement (1931) to the Anopheline Larvae of India, Ceylon and Malaya.**—36 pp. With plates XIII–XXI. [31 refs.] 1931. Calcutta & Simla: Thacker, Spink & Co., Ltd. [Rs. 1/12.]

Some tables supplementary to the work reviewed in Vol. 24, p. 772 of this *Bulletin*.

A. A.

Yang (Ching-po). **Observations on the Incidence of Anopheles in a Rural Area outside Peiping and on the Conditions of Anopheles Breeding.**—*Nat. Med. Jl. China.* 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 513–520. With 1 chart in text & 5 figs. on 1 plate. [1 ref.] [Peiping Union Med. College, Peking.]

The land about Peiping is largely rice, other watery cultivation in ponds fed from streams, and fish-ponds in which are five local species of fishes. Anopheles gradually increase in numbers from the latter part of July to the latter end of August and then there may be a sudden large increase after heavy rainfall. Anopheles larvae are not found in ponds that are quite clear of vegetation and contain fish, but in ponds thickly covered with vegetation they are as abundant as elsewhere in spite of the presence of fish. Experimentally, the deep fish are just as destructive of larvae as the surface-feeders; and of aquatic vegetation Ceratophyllum seems more attractive to Anopheles than Spirodela. The conclusion is that clearance of floating vegetation and stocking with fish would be an improvement.

A. A.

Feng (Lan-chou). **The Larvae and Pupae of the North China Species of Anopheles; their Structure and Breeding Habits.**—*Nat. Med. Jl. China.* 1931. Aug.–Oct. Vol. 17. No. 4/5. pp. 493–512. With 31 figs. on 4 plates. [16 refs.] [Peiping Union Med. College, Peking.]

Description and parcel figures of 4th stage larvae, pupa, and breeding-habits, and notes on the hibernation of *Anopheles pattoni*, *A. lindesayi* var. *japonicus*, and *A. hyrcanus* var. *sinensis*. *A. pattoni* winters in the early larval stages, under ice, even under ice 18 inches thick, and the larvae derive much benefit from silk-weeds, which keep them submerged and supply them with oxygen. The other two species probably winter as adults.

A. A.

Christophers (S. R.) & Puri (I. M.). **Notes on Some Anopheline Mosquitoes collected in Sierra Leone including Differentiation of *Anopheles dthali* Patton (Mediterranean) as a Distinct Species from *Anopheles rhodesiensis* Theo. (Ethiopian).**—*Indian Jl. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1133–1166. With 3 text figs. & 3 plates. [5 pages of refs.] [Central Research Inst., Kasauli.]

A paper of critically descriptive entomology. *A. rhodesiensis* and *A. dthali* are compared and discussed, the geographical distribution of each is given in particular detail, and the adult of the former is described. New adult characters are noticed and the fullgrown larva is described for the

following species—*A. theileri*, *A. smithii*, and *A. gambiae*. *A. freetownensis* is declared as a new species. A bibliography of 5 pages is given for 8 species and 2 varieties.

A. A.

LEESON (H. S.). **Anopheline Mosquitos in Southern Rhodesia 1926–1928. A Report on Investigations made during Researches on Blackwater Fever conducted by Dr. G. R. Ross.**—No. 4 of the *Memoir Series of the London School of Hygiene & Tropical Medicine*. pp. ix+55. With 10 text figs. & 15 plates. 1931. Mar. London: School of Hygiene & Tropical Medicine. [8s.]

As recorded in this excellent report, 14 species of Anophelini and 50 species of Culicini were collected in S. Rhodesia. Of the 4,417 adult anophelines collected in the course of at least a year, about 46 per cent. were *A. funestus*, about 19 per cent. *A. gambiae*—these two species being the only two found carrying infection with Plasmodium—about 16 per cent. *A. pretoriensis*, about 12 per cent. *A. rufipes*, and about 4 per cent. *A. squamosus*, all the other nine species together amounting to only about 3 per cent. Keys for discriminating the adult males and females and the fourth-stage larvae of these Anophelines are given; the natural habitats and the hut and house haunts of the adults and the breeding-places where their larvae were found are described. These details are particularly full in the case of the first four species which are the commonest in the Shamoa district and include the only two known local carriers of malaria. The report includes recommendations for improving the human environment, treatment of breeding-places, and protection against adult anophelines, and it is bountifully illustrated with views of breeding-places and indoor and outdoor haunts of the adult insects.

A. A.

LEESON (H. S.). **The Dry Season Habits of Two Species of Anopheles in Southern Rhodesia.**—*Proc. Entom. Soc. London.* 1930. Dec. 31. Vol. 5. Pt. 2. p. 26.

The hibernation and the seasonal prevalence of *Anopheles funestus* and *A. gambiae* in highlands (3,600 ft.) of S. Rhodesia are here contrasted. Adults of both species first appear there about the beginning of the wet season (December or January). The numbers of *A. funestus* increase during the wet season, reach their maximum in February, and then gradually diminish, month by month, until by December none are to be found. The numbers of *A. gambiae* also increase during the wet season to a maximum in March, but then drop rapidly to 0% in June. During the ensuing dry season females of *A. funestus* full of eggs, could be found hiding under rocks in the dry (though still damp) beds of rivers. In August these females leave their retreat and after laying their eggs near marshy and riverside ground, die; by December no adults can be found, but young larvae are plentiful in the breeding-places, and in January the new generation of adults comes forth. In contrast *A. gambiae* disappears from the highlands altogether both adults and larvae in the dry (winter) season; its

larvae however could then be found at 1,500 ft., and down to 1,300 ft. its larvae, pupae, and adults were abundant. It merely shifts to warmer quarters and nurseries during the winter (dry) season.

A. A.

DE MEILLON (Botha). **Notes on the Larvae of Some South African Anophelines.**—*Bull. Entom. Res.* 1931. June. Vol. 22. Pt. 2. pp. 237–243. With 7 text figs. [9 refs.] [S. African Inst. for Med. Research, Johannesburg.]

The larvae of S. African anophelines are here grouped in 2 major and 4 subaltern sections according to the method of PURI. The larvae of *A. natalensis* and *A. ardensis* are compared. Some characters of the larvae of *A. squamosus* and of *A. theileri* are discussed.

A. A.

DAVIS (Nelson C.). **A Note on the Malaria-Carrying Anophelines in Belém, Pará, and in Natal, Rio Grande do Norte, Brazil.**—*Riv. di Malariologia.* 1931. Jan.–Feb. Vol. 10. No. 1. pp. 43–51. [7 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

*Anopheles darlingi* is now, for the first time, proved to be a carrier of malaria ; of 200 specimens of this species caught in houses in Belém (Pará, Brazil) 22 per cent. were infected—the salivary glands in approximately 5 per cent. of 181 examinations of those organs. Filaria " embryos " were found in 14 specimens of *A. darlingi* (and embryos of *F. bancrofti* in the blood of 5 of 25 persons examined).

In Natal (Rio Grande do Norte, Brazil) 62·8 per cent. of 172 *A. gambiae* caught in houses were infected with malaria—the salivary glands in 30·2 per cent. of the 52 examined.

In these cities high infection-rates of Anopheles were definitely " associated with severe outbreaks of human malaria."

A. A.

SHROPSHIRE (J. B.). **Mosquito Fighters in Panama.**—*Milit. Surgeon.* 1931. June. Vol. 68. No. 6. pp. 769–776. With 3 text figs.

A chatty paper by a Field Sanitary Inspector of the Panama Canal-Zone Departments. (The F.S.I. is a subordinate officer of the Canal Medical Department ; his " chief duty is the elimination of the anophelines ", a duty that takes him " into far-away places, into the jungles . . . even into the mangrove swamps " of the sea-coast.) The civilian " mosquito-fighters " service consists of 60 men—5 foremen, 5 mosquito hunters, 1 skilled mason and a mate, 35 mechanics, and 13 labourers—distributed in 5 stations but reasonably mobile on occasion. The foremen and hunters have a practical knowledge of culicology, sufficient for their duty of searching for breeding-places and catching winged anophelines in barracks ; they can also identify a house-fly maggot, since the Field-Inspector, who organizes their work, also lends a helping hand in other branches of sanitation and keeps an eye on the trespasses of prospective squatters. The routine working hours in the service are 7 a.m. to 3.30 p.m. " Nine-hundred-and-ninety-nine of adult anophelines caught in barracks are these "—*A. tarsimaculatus* and *A. albimanus*—" the Zone's principal malaria transmitters."

A. A.

Cardamatis (J. P.). Les espèces de moustiques en Grèce et tout particulièrement d'Athènes. [**Mosquitoes of Greece, and Particularly of Athens.**]—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 122–131. With 4 text figs. [11 refs.]

The following species of Anopheles are included in the list : *A. algeriensis, bifurcatus, atheniensis* (n. sp.), *cardamatidis, elutus, maculipennis, macedoniensis, palestinensis* (Island of Paros), *pseudopictus, sinensis, superpictus, vagus.*

A. A.

Harvey (D.) & Symes (C. B.). **Oxygen Absorption of Natural Waters in Nairobi with Reference to Anopheline Mosquitos.**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 59–64.

The paper consists of tables and explanatory notes that cannot be further abridged. The authors' summary consists of "Suggestions" the most informative of which is that the waters that produced most Anopheline larvae were "those in which the $O_2$ values varied most during the period."

A. A.

Russell (Paul F.). **Anopheles Mosquitoes and Avian Malaria.**—*Amer. Jl. Trop. Med.* 1931. Mar. Vol. 11. No. 2. pp. 145–146. [1 ref.]

The author records the fact from Manila—of some meaning for those who search wild Anopheles for evidence of malaria infection—that although *Culex fatigans* and *Aëdes aegypti* will feed freely on canaries, Anopheles under the same experimental conditions will not. During a term of four months over 8,000 Anopheles of 12 Oriental species were caged with canaries, but they preferred starvation to feeding on them. They would however take canary blood mixed with saline and mango juice.

A. A.

Roubaud (E.). Recherches expérimentales sur les générations et les phases biologiques de l'*Anopheles maculipennis*. (**Experimental Research on Generations and Biological Phenomena in** "*Anopheles maculipennis.*")—*Riv. di Malariologia.* 1931. Jan.–Feb. Vol. 10. No. 1. pp. 1–42. With 12 text figs. & 6 figs. on 1 plate. [20 refs.] English summary p. 157. [Pasteur Inst., Paris.]

In his insectarium in Paris Roubaud has raised a series of three or four generations of *Anopheles maculipennis* in the course of a year. At length the reproductive activity of the females is suspended as a result not of winter cold as most people think, but of a state of fatigue called by him "asthenobiosis" and characterized by inactivity, hypertrophy of the Malpighian tubules, wasting of the ovaries, and accumulation of fat—what most people call winter torpor or hibernation (see this *Bulletin*, Vol. 21, p. 141). This paper is a further study of "asthenobiosis." From his present observations the author thinks that the existence of two varieties of this species averred by Dutch authors—one a harmless variety, remaining completely torpid throughout the winter, not feeding and not developing eggs but storing fat ; the other a dangerous variety, not being completely torpid throughout winter and not storing fat, but occasionally sucking blood and capable of harbouring malarial infection—is not sufficiently established.

A. A.

i. Roubaud (E.) & Gaschen (H.). Sur l'adaptation zoophile de l'*Anopheles maculipennis*. (Rapports entre la différenciation maxillaire et la fécondité.) [**Maxillary Armature and Fecundity of** *A. maculipennis*.]—*Bull. Soc. Path. Exot.* 1931. Mar. 11. Vol. 24. No. 3. pp. 203–209. With 1 text fig. [1 ref.]

ii. ——. Nouvelle contribution à l'étude du zootropisme anophélien (*A. maculipennis*).—*Ibid.* pp. 229–246. With 7 text figs. [3 refs.]

i. A comparison, with numerical statements and illustrative text-figure of maxillae, of the *fertility* of two different lots of *Anopheles maculipennis* ♀♀—the one lot coming from places in Morocco and having maxillae not differentiated in a zoophilian sense, the other lot from the west of France and having maxillae differentiated for zoophily. The authors state that the results confirm an important fact, to wit that " the mean fertility of the females increases as their maxillary armature is differentiated in favour of zoophily "—i.e., maxillae stronger and with serrations more than 14.

ii. This is a polished restatement of the author's well-known theory of a zoophile race of *Anopheles maculipennis*. It is well and clearly set forth.

A. A.

Trensz (F.). L'index maxillaire d'*Anopheles maculipennis* et la théorie du zootropisme anophélien. [**The Maxillary Index of** *Anopheles maculipennis* **and the Theory of Anopheline Zootropism.**] —*Arch. Inst. Pasteur d'Algérie*. 1930. Mar. Vol. 8. No. 1. pp. 1–70. With 45 graphs & 2 plates. [75 refs.] [Pasteur Inst. of Algeria, Algiers.]

Roubaud's theory of zoophily and zootropism in *Anopheles maculipennis* was noticed in this *Bulletin* (Vol. 19, pp. 476–478) nearly nine years ago, as was also his earliest defence and expansion of it against Langeron's and other French colleagues' criticism (*ibid.* pp. 478–479). Often since then has this theory received direct or incidental notice here, the latest instance being a criticism by Trensz (this *Bulletin*, Vol. 27, p. 911) who states that he cannot discover a single fact in its favour.

In the present paper of 70 pages Trensz now records in much detail the observations on which this shattering conclusion is based. The observations of the maxillary index (i.e. the number of serrations in the female maxilla) were made in homesteads, farms, villages, communes, etc., in Algeria, Italy, and France. In each such place the local Anopheles were studied (*a*) in themselves with regard to their maxillary index, their frequency and their condition (whether gorged or not), in the houses and in the outhouses for domestic animals, and their breeding places; and (*b*) in their environment, with regard to its reputation for malaria, and its human and domestic-animal population. Thus, in each place and each region of this wide survey the maxillary index could be determined in circumstances both favourable and unfavourable to its modification in the direction of " zoophily."

In Algeria 861 Anopheles from *gourbis* very unfavourable for zoophily and 422 from farms favourable for zoophily were examined. They had the same maxillary index, 14–15, 14 predominating. Here we must infer a zoophile and " protective " Anopheles fauna in a notoriously malarious country.

In Italy (provinces of Bologna, Ferrara, and Ravenna) 2,028 Anopheles from 22 farms were examined. Those from houses, pigstyes, cattlesheds, and stables had the same maxillary index—the graphs showed no differentiation of local types of dentition. The gorged females had the same index as those not gorged. No correlation was observed between the degree of increase of the maxillary index, the proportion of gorged insects, the abundance of cattle, or the malarious nature of the localities visited.

In France 727 Anopheles from 3 farms very favourable for the differentiation of distinct types of dentition had a maxillary index 16–17. Such an index would suggest an imperfect adaptation to cattle and would therefore point to circumstances favourable to malaria ; but malaria disappeared from two of these places fifty years ago, although the distribution of breeding-places [of Anopheles], and the numbers and the stalling conditions of cattle have not changed.

Finally, with regard to ROUBAUD's maxillary index, the author argues with much force that it is mathematically of no value, because of the fortuitous individual variations in the number of maxillary denticles. Instead of the mean of 25 examinations employed by ROUBAUD, examinations of the order of 10,000 would be required for calculating the mean. To illustrate the variation in the number of maxillary denticles the author gives the following instances : 1. In a series of 1,090 maxillae from the same village six had 13 denticles, fifty-three had 14, a hundred and forty-five had 15, two-hundred and eighty-six had 16, two-hundred and seventy-two had 17, a hundred and seventy-six had 18, a hundred and eighteen had 19, twenty-eight had 20, and six had 21. 2. In a batch of 400 Anopheles only 35 per cent. had the number of denticles equal in *both* maxillae ; in 44 per cent. there was a difference of 1 tooth ; in 16 per cent. a difference of 2 teeth ; in 4 per cent. a difference of 3 teeth, and in 1 per cent. a difference of 4 teeth between the two maxillae. 3. A hundred Anopheles from the same place were taken by chance and divided into four lots of 25 each ; the individuals of the four lots were measured, and the maxillary indices of the four lots were, severally, 14·1, 14·8, 15·1, 15·1.

A. A.

VAN THIEL (P. H.). Züchtungsversuche in Zusammenhang mit dem Rassenproblem bei *Anopheles maculipennis*. [**Breeding-Experiments in Connexion with the Race Question in** *Anopheles maculipennis*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Apr. Vol. 35. No. 4. pp. 208–227. With 2 text figs. [22 refs.] [Inst. for Trop. Med., Leiden.]

An interesting biological study—rather detached from the medical purview—on the influence of the colour of the vessel in which larvae (of *Anopheles maculipennis*) are raised, upon the colour and size of the adults. It is a critically experimental review of the work of ACHUNDOW (see this *Bulletin*, Vol. 26, particularly p. 250, also reference in p. 814). The present author confirms ACHUNDOW in respect of the influence of the colour of the larval breeding-vessel upon the colour of the adult *Anopheles maculipennis*. But the influence of the colour upon the size of the adult was confirmed only when all the larvae excepting one were removed from the breeding-vessel—and here of course other environmental influences vitiate any conclusion from one particular influence. Only exceptionally, says the author, can the colour of the bottom of a larval breeding-ground influence the colour and size of the adult : for instance, only the existence of genetic differences can explain satisfactorily the difference in colour and size between typical *A. maculipennis* and the race or variety *A. m. atratus*.

A. A.

Bruck (R.). Zur Frage über die Ernährung der Larven von *Anopheles maculipennis*. [**On Larval Nutrition in** *Anopheles maculipennis*.]—*Travaux Soc. Naturalistes de Léningrad.* 1930. Vol. 60. No. 1. pp. 15–27. [9 refs.] [In Russian. German summary pp. 27–28.] [Natural Science Inst., Peterhof.]

According to the German summary this work facilitates the laboratory treatment of the larvae of this species by describing the mechanical passage of the food through the gut. The time taken from the act of swallowing to the act of defaecation is from 40 to 60 minutes.

A. A.

Pruthi (Hem Singh). **Preliminary Observations on the Influence of Different Concentrations of Hydrogen Ions and Temperatures of Water on Mosquito Larvae** (*Anopheles subpictus*).—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 131–135. [1 ref.]

The author speaks without hesitation of the vital influence of the pH concentration on aquatic life. In the case of *Anopheles subpictus* he found that its larvae appeared to flourish equally well in all pH concentrations between 5·2 and 9·8, but that the number transforming to pupae that hatched adults was greatest at pH 7·4. (Using 15 larvae for each experiment : at pH 3·5, all died in the course of three days ; at pH 5·2, nine pupated and two hatched adults ; at pH 7·4, nine pupated and all hatched adults ; at pH 8·5, five pupated and four hatched adults ; at pH 9, one pupated and hatched ; at pH 9·8 all died without pupating).

With regard to the influence of temperature upon larvae (*A. subpictus*) the author found that although they could live at 32°–34° C. they very seldom pupated (3 out of 45) and still more seldom finished as adults (1 out of 45) at those temperatures ; whereas at 28°–30° C. 22 out of 45 pupated and 19 finished as adults.

A. A.

Pinto (Genserico de Souza). Sobre a presença de *Anopheles costalis* no Brasil. [*Anopheles costalis* **in Brazil.**]—*Folha Med.* 1931. Oct. 5. Vol. 12. No. 28. pp. 330–332. [3 refs.]

In March 1930 Dr. Shannon reported his finding of *A. costalis* in Natal, Rio Grande do Norte, shortly before a severe outbreak of malaria (see this *Bulletin*, Vol. 27, p. 912). The identification was confirmed by Dr. N. C. Davis. The author in the present article describes the characters of *A. costalis* on which the mosquito in question was identified. In houses of that quarter of the town which suffered most from malaria 172 mosquitoes were caught ; on dissection 108 (62·8 per cent.) were found infected, and 52 (30·2 per cent.) had sporozoites in their salivary glands.

At São Bento do Norte, 182 kilometres from the capital, Dr. Rouanet of the Rockefeller Foundation verified the presence of *A. costalis*. The number of persons infected was very large ; in Taipú and Ceará-Mirim some 4,000 daily ; the Alecrim quarter of the capital with 12,000 inhabitants " was completely decimated ", and of the Natal frontier population along the banks of the Potengy nearly all suffered.

The author considers three possible ways in which *A. costalis* may

have been introduced: (1) by aeroplanes which made Natal their first landing place in Brazil after crossing the Atlantic; (2) as larvae on the quick packets which cross weekly from Dakar to Natal, or (3) as adults on these boats. By exclusion he decides that the third is the most probable. He speaks of the invasion of South America by *A. costalis* as an exceptional if not a unique phenomenon, but notes that the epidemic of Mauritius and Réunion in 1866 were due to the recent introduction of the same species, quoting Ross in support.

H. H. S.

Mer (G.). **Notes on the Bionomics of *Anopheles elutus*, Edw. (Dipt., Culic.).**—*Bull. Entom. Res.* 1931. Mar. Vol. 22. Pt. 1. pp. 137–145. With 2 text figs. [12 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

The seasonal variations in the size and form of the floats of the eggs are described and figured. Hibernation is not complete; the females feed and grow fat, and although a slow development of the ovary goes on it never progresses beyond the 2nd stage.

A. A.

de Meillon (Botha). **A New South African Anopheline.**—*Jl. Med. Assoc. South Africa.* 1931. Aug. 8. Vol. 5. No. 15. pp. 482–483. [S. African Inst. for Med. Research, Johannesburg.]

This new species from the Northern Transvaal and Natal is described as being not unlike *Anopheles gambiae* in appearance, except that the legs are not speckled and the tips of the female palpi are dark. The larvae were found in pools in beds of streams, along with *A. pretoriensis* and *A. gambiae*.

A. A.

i. Shortt (H. E.). **Note on the Feeding Habits of *Phlebotomus minutus*.**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 1047–1049. [2 refs.]

ii. Napier (L. Everard). **Feeding Habits of Sandflies of the Minutus Group.**—*Ibid.* Apr. Vol. 18. No. 4. pp. 1377–1381. [7 refs.]

i. The author refers to a statement in a paper by Lloyd and Napier [this *Bulletin*, Vol. 28, p. 514] that *Phlebotomus minutus* feeds on the blood of cattle and man—a statement entirely contradictory to that of Howlett, who affirmed that reptile (gecko) blood is its normal nourishment, and completely opposed to his own experience of *P. minutus* as an insect that cannot be got to feed on man. The author propounds an alternative verdict—either wrong identification of fly, or, unreliable technique employed in precipitation tests.

ii. Napier here states (1) that he was from the first quite aware that *P. minutus* had been supposed to feed only on lizard blood and that he therefore took good care to get expert confirmation that the species he and Lloyd were dealing with was of the *minutus* group; and (2) that he is quite convinced both of the trustworthiness of the precipitin test employed and of the accuracy of Lloyd's technique. Shortt himself also (p. 1385) writes that he has "every confidence" and reliance in the methods employed by his old friend Lloyd.

A. A.

NITZULESCU (Virgil). Essai de classification des phlébotomes. [**Classification of Phlebotomus.**]—*Ann. Parasit. Humaine et Comparée.* 1931. May 1. Vol. 9. No. 3. pp. 271–275. [Parasit. Lab., Faculty of Med., Paris.]

After a criticism of the classification proposed by FRANÇA and PARROT and that proposed by SINTON, the author subdivides the genus Phlebotomus into the following five subgenera :

(1) Subgenus *Sintonius*, with buccal armature and crenulate spermathecae ; type *P. hospitii*. (2) Subgenus *Brumptius*, with buccal armature and non-crenulate spermathecae ; type *P. minutus*. (3) Subgenus *Larroussius*, without buccal armature, with spermathecae crenulated and more or less long in neck ; pharynx as in the type *P. major*. (4) Subgenus *Phlebotomus* without buccal armature, with spermathecae crenulated and short in neck ; type *P. papatasii*. (5) Subgenus *Adlerius* without buccal armature and with smooth spermathecae ; type *P. chinensis*.

A. A.

WOOD (R. C.). **Tsetse Fly Report, 1930.**—*Nyasaland Protectorate Ann. Med. Rep. on Health & Sanitary Condition for the Year ending 31st Dec., 1930.* Appendix IV. pp. 47–50.

This report relates entirely to the southerly and south-easterly spread of *Glossina morsitans* in Nyasaland, which is said to be still very serious and to demand close and constant watch in all districts. Speaking generally, the position at the end of 1930 did not show any appreciable difference from that of the previous year, although the widespread southerly migration in the Fort Manning and the minor wave in the Dowa district seem to have spent themselves. The barrier formed by clearing, native settlement, and cultivation in the Likuni valley has shown marked improvement and furnishes hopes. The author is convinced that there is " no connexion whatever between the movements of game and fly as they normally take place ", and he is constantly puzzled by the mysterious and inexplicable movements of the fly. In one place he periodically observes swarms of fly on the trail of large herds of elephants to a certain point and there leaving them entirely. He finds places in fly-country heavily infested one year and almost free the following year, and vice versa, without any difference in the numbers of big game. In one district he sees hundreds of natives bringing baskets of tobacco to market from villages in fly-country, and laden motor-lorries plying along a road suitably wooded for fly, and yet no fly is to be seen in the market-place, or on the lorries when they are stopped for examination ; while in another district the fly is in the market-place and in the country roundabout for a few miles, yet a mile or so farther along the road it has disappeared. He thinks that the fly must have periodic migratory impulses on a large scale, and cannot possibly be guided by sight alone.

A. A.

FULLER (Claude) & MOSSOP (M. C.). **Entomological Notes on** *Glossina pallidipes*.—*Union of S. Africa. Dept. Agric. Science Bull. No. 67.* 1929. 27 pp. With 1 fig. [11 refs.]

This paper is based on eight weeks' observation of *Glossina pallidipes* in summer of 1927–28, on the banks of the white Mfolozi (Zululand),

where it was then very numerous. The authors addressed themselves to study the way the fly attacks the living victim, its behaviour towards inanimate objects and its reactions to heated objects, and its powers of smelling and seeing ; they also studied the mechanisms of its sucking, and the effect of arsenic upon the insect.

In attacking a quadruped the fly always makes for the navel or its neighbourhood ; if dislodged it commonly makes for the legs, or, if frequently dislodged, it may at last drop to the ground and wait ; some desist and disappear (though the insect is as pertinacious as a housefly) ; but if it gets hold and becomes sated it settles in the grass, or in neighbouring bushes, or in more distant covert and flying close to the ground. Whether the creature is guided chiefly by scent, or by sight, or other stimulus is presently considered.

With regard to artificial decoys " dummies ", etc. (see HARRIS in this *Bulletin*, Vol. 28, pp. 524, 525) the authors hold the opinion that such things are disregarded by the flies unless associated with movement and scent, and they think that Mr. R. H. HARRIS's observations of this matter are injured by his not having allowed for the presence of observers, or perhaps of some unnoticed wild animal, near his contraptions ; in their own experience, here recorded in full particular, the horizontal " log dummy " and the artificial bushbuck did not prove specially attractive to *G. pallidipes*. Only once was a fly found on the horizontal log, and then when a motor-car had stopped within a yard of it. The artificial buck was set in a thicket in the morning, and when watched for 45 minutes in the afternoon it attracted only two flies. When replaced by a live cow and set up again at about 20 feet distance it was observed, in the course of 90 minutes' watch, to be " inspected " by 18 flies, while 80 flies were caught on the cow which was attacked at the rate of about one a minute. [HARRIS (*l.c.*) insists that a dummy shall be placed not among foliage but where it casts a sharp shadow].

With respect to the reaction to light and the powers of sight : in the authors' observation *G. pallidipes* is phototropic but " exhibits phases of negative phototropism ", as when replete or gravid. Although cleaving to shade it can cross wide open tracts, but the authors think it incredible that in this adventure it can be guided by sight. The creature can find its way in the forest, and was attracted at night to a lighted room occupied by them, and could settle upon the black spots of the legs of their white cow ; but from their own observation they conclude that its powers of sight are not much better than those of the housefly and, " that such recognition of form as it may possess is doubtful and at best limited to distances which are to the vertebrate eye extraordinarily short."

On the other hand they conclude that *G. pallidipes* has an acutely discriminative sense of smell. This they suspected when they observed the insect probing inanimate matter—a table, a black cloth, a hessian tent, etc.—having an animal taint, and tested in a series of experiments culminating in one where a cow was housed out of sight in a closed hessian tent set up in a clearing in a thicket. Before the cow was confined the tent was left for two days, to get free of any taint of man. Immediately the cow was impounded the fly began to arrive, showing a strong tendency to creep in from below. From their many observations of this variety the authors feel fairly sure that the insect when hunting flies low, to pick up and follow its quarry as a dog does by scent, that when in the chase it meets a strange object

it tests it by scent (probing with its proboscis), and that in this procedure its " vision is in effect non-operative." [Zoologists in general will find it hard to agree that eyes of such large proportions as those possessed equally by both sexes of Glossina, are Nature's enactment for an environment where eyes would be " inoperative " in the decisive business of finding food. But, after all, the question whether the fly is or is not attracted to an experimental trap of a certain visible kind in a certain light is one that is better decided by a jury of experimenters than by dialectics ; and also it must be remembered that JACK [below] speaks as witness of a " decidedly impressive " demonstration of the efficacy of the HARRIS decoy trap for *G. pallidipes*.]

In finally reported experiments with arsenic the authors found that *G. pallidipes* would feed upon a cow wet with a weak solution (0·1 per cent.) of sodium arsenite without any ill effect ; and that when allowed to rest upon and probe through cotton-wool saturated with any strong solutions of this salt, fatal effects followed only with solutions that would also be fatal to any dipped cattle that licked them.

A. A.

SOUTHERN RHODESIA. REPORT OF THE SECRETARY, DEPARTMENT OF AGRICULTURE FOR YEAR 1930. pp. 66–72. [**Report on Tsetse Fly Investigations by the Chief Entomologist** (JACK, Rupert W.).]

In respect of matters of general interest this report adds little to what has been noticed already in this *Bulletin* (Vol. 28, pp. 522, 523). The tendency of the fly (*G. morsitans*) to recover its former extensive limits is noted and the attempts to check its progress are described and criticized : and the slow but sure effect of hunting game in the confines of fly-infested country, the maintenance of game-free zones, and the control of wheeled traffic from fly-striken areas are here, as there, appraised. With regard to the HARRIS fly-trap for *G. pallidipes* (see this *Bulletin*, Vol. 28, pp. 524, 525) the author notices that *G. morsitans* also has an inclination for shaded enclosures, being attracted even to empty boxes lying on their side, and he mentions his visit to Zululand and the " impressive " demonstration there of the value of the trap, by Mr. R. H. HARRIS.

To change the subject : the riddance from ticks (*Ornithodorus moubata*) of badly infested pigsties was effected only by burning piles of wood against *both* sides of the walls, which were 9 inches thick.

A. A.

NASH (T. A. M.). **The Relationship between** *Glossina morsitans* **and the Evaporation Rate.**—*Bull. Entom. Res.* 1931. Sept. Vol. 22. Pt. 3. pp. 383–384. With 1 text fig.

It is shown by a graphic record running for 18 months that a direct relation exists between the mean monthly-evaporation rate and the mean monthly fly-density. When the evaporation curve runs high the density of the fly decreases, and conversely.

A. A.

Jackson (C. H. N.). **An Experiment on the Feeding Habits of** *Glossina swynnertoni* **(Dipt.).**—*Bull. Entom. Res.* 1931. June. Vol. 22. Pt. 2. pp. 175–181.

These interesting experimental observations—made in July and August—on the feeding habits of *Glossina swynnertoni* were based on the author's earlier observations which showed that the number of "hungrier flies" marked in woodland (Berlinia-Brachystegia) and recaptured in "female centres" (their supposed feed-grounds) during the first three days after being marked bore a higher proportion to the number recaptured afterwards than did the corresponding numbers for "originally repleter flies". The chosen area of observation and its botanical and large faunal characters, and the technique of experiment are described, and the statistics of the flies marked (1,028 male and 110 female) and recaptured (533) once or several times (102> 6) are given in particular detail. The conclusions are, for the place and the season, that "hungrier flies" precede "repleter flies" in the flight from the woodland to the open glade that may be regarded as the feeding-ground; that flies visit the feeding-ground about once every fifth day; and that study of the record of flies several times recaptured suggests that flies "complete their hunger cycle" in about 5 days.

A. A.

Hoare (Cecil A.). **The Peritrophic Membrane of** *Glossina* **and its Bearing upon the Life-Cycle of** *Trypanosoma grayi.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. June 30. Vol. 25. No. 1. pp. 57–64. With 2 text figs. [9 refs.]

In the investigation of the life-cycle of *Trypanosoma grayi* of the crocodile in *Glossina palpalis* the author has studied the relation of the peritrophic membrane to the distribution, in the intestine of the fly, of the developmental forms of the trypanosome.

The mode of origin, structure, and function of the peritrophic membrane in Glossina were first elucidated by Wigglesworth (see this *Bulletin*, Vol. 27, p. 315). All that need be noticed here is that it is a fragile chitinous structure running throughout the entire length of the alimentary canal, its lumen being continuous with that of the oesophagus while its posterior end opens into the bulbular rectum; so that the food of the fly is never in contact with the intestinal epithelium, the peritrophic membrane acting as a dialyser in the process of digestion. (The author's evidence is that the membrane in question, although fragile and liable to rupture, is actually continuous throughout the alimentary canal; according to Wigglesworth, it is constantly continuous only to the anterior part of the midgut, and is at best only fragmentary in the hindgut).

In the development of *T. grayi* within the peritrophic membrane the ingested trypanosomes multiply in the region of the midgut, then migrate to the region of the hindgut where ultimately they develop into the infective forms. But first, they have to escape from the open end of the peritrophic membrane into the lumen of the hindgut; there they become attached to the gut-wall, multiply and swarm some of them *forwards* and into the midgut, and some of them backwards (on

completing their final stage of infective development) to be discharged *per anum*, and some remaining for a time in the " ileum " (or anterior part of the hindgut) to complete their development and then to be discharged also. It is thus seen that the localization of *T. grayi* in the course of its development in the tsetse-fly is determined by the presence of the peritrophic membrane.

The histology of the hindgut of the tsetse has been described by STUHLMANN, but in view of its importance as the site of development of *T. grayi* and in its bearing upon the peritrophic membrane the present author describes some detail of its structure. Three regions are to be distinguished—an anterior piriform " ileum ", a tubular " colon ", and a bulbar rectum with its tubular extension to the anus.

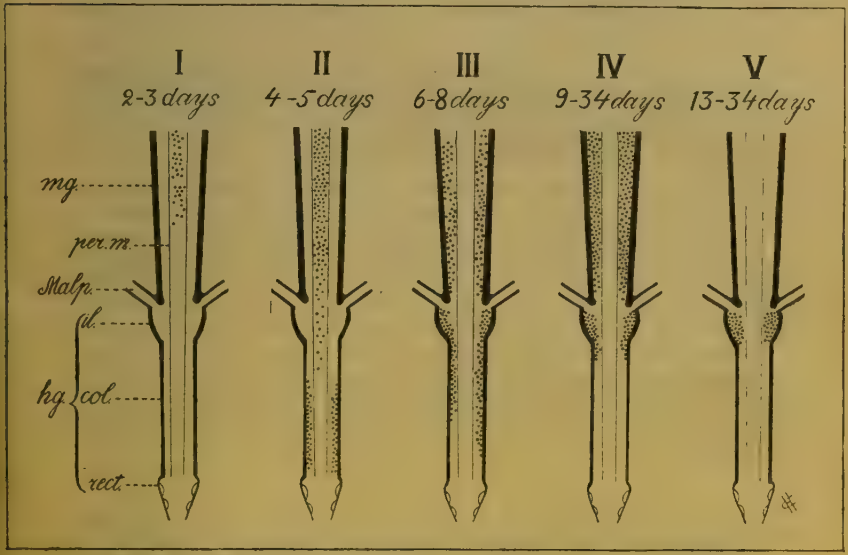


Fig. 1.—Diagram showing the distribution of *Trypanosoma grayi* in the intestine of *Glossina palpalis* in chronological order of its development: from 2 to 34 days after infection of the fly. (The flagellates are indicated by dots.)

*mg.*=mid-gut; *hg.*=hind-gut, with *il.*=ileum, *col.*=colon, *rect.*=rectum; *per.m.*=peritrophic membrane; *Malp.*=Malpighian tubes.

[Reproduced by permission from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*.]

There is a distinct sphincter-like valve at the junction of midgut and ileum. Each epithelial cell of colon and rectum carries a retrorse spinule. There is in the posterior moiety of the colon (and seen best when the gut is not distended) a second (prorectal) valve with retrorse-spinulose epithelium.

This interesting paper is concluded by a list of references to the structure and function of the peritrophic membrane in Glossina, in Drosophilid flies, and in Cladocera.

A. A.

Wigglesworth (V. B.). **Digestion in** *Chrysops silacea* **Aust. (Diptera, Tabanidae).**—*Parasitology.* 1931. Jan. Vol. 23. No. 1. pp. 73–76. [15 refs.] [School of Hyg. & Trop. Med., London.]

*Chrysops silacea* is an intermediary host of *Loa loa*. The visceral anatomy and the histological changes in the gut during digestion are much as described in Tabanus (Cragg, *Ind. Jl. Med. Res.*, 1920). The oesophagus is slightly invaginated in the dilated fore end of the midgut and, as described in Glossina by Lester and Lloyd [this *Bulletin*, Vol. 26, p. 263] there is a valve or sphincter at the after end of the midgut. Digestive enzymes, which are confined to the after half of the midgut, include an active invertase, a weak amylase, and an active tryptase and peptidase. The crop is not a reservoir for blood; in the fresh-emerged fly it is distended with air which doubtless keeps the body inflated until the body-wall becomes stiff. Coagulins and anticoagulins were not sought—probably, as described in Tabanus, the saliva is anticoagulant.

A. A.

Kadlez (N.) & Kubarev (M.). **On the Question of Gastrophilomiasis. (5 Cases of Creeping Disease.)**—*Rev. Microbiol. Epidémiol. et Parasit.* 1930. Vol. 9. No. 3. pp. 407–424. With 9 text figs. [34 refs.] [In Russian. English summary.]

The authors describe five cases of creeping eruption observed in Samara (Russia), due to the larvae of *Gastrophilus* (*intestinalis* or *nasalis*?). In all the cases the eruption was localized in the exposed parts of the skin, chiefly of the face; the burrows were directed downwards; in every case there was only a single simple burrow. The larvae progressed at the average rate of 1·7 to 7 cm. per diem.; they were extracted from the ends of the burrows with the help of a syringe needle, and the site was treated with iodine. This was followed by rapid healing of the lesions, leaving no traces of the eruption. A general description of Gastrophilus and other myiasis-producing flies is given, together with a historical survey of the incidence of creeping eruption.

C. A. Hoare.

Schwarz (A.). Beitrag zur Ätiologie der Creeping Disease. [**A Contribution to the Aetiology of Creeping Disease.**]—*Dermat. Woch.* 1931. Apr. 25. Vol. 92. No. 17. pp. 620–625. With 3 text figs. [20 refs.]

A case of creeping disease due to a larva of the bot-fly (*Gastrophilus equi*) in an infant that had been allowed to lie out in the field in warm weather in the neighbourhood of Lemberg. The account is well illustrated to show the meandering track of the larva and (in section) the anatomical detail of the burrow and the larva. In a longish introduction other parasites that cause creeping eruptions of the skin are told off—Hypoderma and several species of Nematode worms.

A. A.

Coulon (G.) & Dinulescu (G.). Un cas de myiase oculaire à *Oestrus ovis* L. en Corse. [**Ocular Myiasis due to** *Oestrus ovis* **L., in Corsica.**]—*Ann. Parasit. Humaine et Comparée.* 1931. Mar. 1. Vol. 9. No. 2. pp. 140–143. With 7 text figs. [Anti-Malaria Dispensary, Ajaccio, & Parasit. Lab., Faculty of Med., Paris.]

The patient in this case had no particular history, but he had nothing to do with sheep or stock. He arose from his bed with tingling eyes, and

5 hours afterwards went to hospital complaining of sharp pain in those organs, which now were inflamed and watery. About 15 first stage larvae of *Oestrus ovis* were discovered in each conjunctival sac. Excellent figures are given of this stage.

A. A.

Murdoch (F. F.) & Smart (T. L.). **A Method of producing Sterile Blowfly Larvae for Surgical Use.**—*U.S. Nav. Med. Bull.* 1931. July. Vol. 29. No. 3. pp. 406–417. With 10 figs. (9 on plates). [2 refs.] [U.S. Naval Med. School, Washington.]

This paper describes the rearing of blowfly maggots for use in a treatment of chronic osteomyelitis devised by W. S. Baer of Baltimore. It gives, of course, the elementary facts of metamorphosis and life-history of the blowfly and a warning against blowfly-like maggots, such as *Cochliomyia macellaria*, that feed on living tissue ; but for the most part it is a very particular description—which cannot be abridged—of the elaborate apparatus and ritual of a rigid sterilizing ménage.

[The interested reader should refer to papers on raising sterilized blowflies *ab ovo* by Woolman (see this *Bulletin*, Vol. 18, p. 200 ; Vol. 19, p. 117 ; Vol. 20, p. 463, and Vol. 25, p. 825) ; and on experimental breeding of blowflies by Cousin (*Id.*, Vol. 23, p. 871 and Vol. 24, p. 432).]

A. A.

King (H. H.), George (P. V.), Mankikar (D. S.) & Jesudasan (F.). **A Rat-Flea Survey of the Madras Presidency.**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 727–783.

Seven more reports of the rat-flea survey of the Madras Presidency first noticed in this *Bulletin* Vol. 27, p. 319. They are full of gazetteer detail on the position, status, population, housing and sanitation, meteorology, trade, etc., of the towns individually surveyed. The survey was in progress during 1929 and 1930.

A. A.

Jolly (G. G.), Fenn (V. W.) & Dorai (R.). **Rat-Flea Survey of Rangoon. Part I. The Port Area Period from 5th January, 1928 to 4th January, 1929.**—*Indian Jl. Med. Res.* 1931. Apr. Vol. 18. No. 4. pp. 1231–1244. With 1 map & 1 chart. [4 refs.]

In this 12 months' survey of the Rangoon Port Area, 7,293 rodents were examined and their 18,884 fleas. *Mus concolor* and *Nesocia bengalensis* in nearly equal proportions made up 62 per cent. and *Rattus rattus* only 8·83 per cent. of the total examined. The indoor rodents (*M. concolor*, *R. rattus* and *Mus musculus*) formed 53·63 per cent., the outdoor species (*N. bengalensis* and *R. norvegicus*) 42·57 per cent., and the indifferent *Cricetus caeruleus* 3·8 per cent. The average number of rats per 100 traps ranged from 36·10 in Feb. to 13·87 in Nov. For all species of rats the flea-index was 2·59, the *X. astia* index being 2·45 and the *X. cheopis* index 0·14. *X. cheopis* showed a preference for indoor rats. A pronounced seasonal fluctuation in the numbers of *X. astia* was demonstrated. Tables indicating a relation between the number of fleas per rat and the weight of the rat, and showing the sex distribution of rats and fleas by species are given.

A. A.

Schuurman (C. J.) & Huinink (A. M. Schuurman-Ten Bokkel). **A Study of the Epidemiology of Plague in West-Java, Specially with a View to a Possible Share of the Musk Shrew.**—*Meded. Dienst d. Volksgesondheid in Nederl.-Indië.* 1930. Vol. 19. Pt. 3. pp. 431–546. With 2 maps, 4 plates, 2 graphs & 1 text fig. [59 refs.] [Plague Lab., Koeningan.]

This voluminous study, which centres on the "musk-rat" or "stink-mouse" *Crocidura caerulea*, casts some damaging reflexions on that unfragrant little shrew as a participator in the diffusion of plague. The study was made in the Cheribon Presidency of West Java, and lasted for 8 months. Besides this obscene shrew, the village rodents are *Rattus rattus grisieventer* (here called "the house-rat"), *R. r. concolor* (also numerous, and very susceptible to plague), *Rattus norvegicus* (scarce), and *Mus musculus*. The rat-fleas, also shared by the "stink-mouse", are *Xenopsylla cheopis*, *X. astia* in small numbers, and *Pygiopsylla ahalae* sporadically.

The very suspicious facts observed about Crocidura in Cheribon are that, judging by trapping, it would seem to be more abundant than the house-rat; that it goes abroad at night, particularly along the main roads, and has been detected in villages other than those where it was first caught; that it nests about houses in proximity to house-rats, that the nests of the two are equally well infested with fleas of the same species, and that its flea-index is as high as—and often higher than—that of the house-rat. Furthermore, rat fleas may remain infectious on a "stink-mouse" for four days; so that even if the animal itself were insusceptible to infection it might still pass its infective fleas to a house-rat in another village. But as has been shown by others elsewhere, and is confirmed here, *Crocidura caerulea* though resistant is not immune to plague. In the present observations a number of shrews caught alive in plague time died of plague in their cages. In some of the cases of experimental infection (by inoculation, by food, and by infective fleas) some of the shrews died, and in others the virus remained active (in the spleen) for at least 17 days.

A. A.

i. Wassilieff (A.). Les rongeurs et puces de la Tunisie et leur rôle dans la propagation de la peste. I. Note préliminaire sur les puces de la Tunisie. [**Rodents and Fleas of Tunisia and their Part in the Propagation of Plague.**]—*Arch. Inst. Pasteur de Tunis.* 1931. Apr. Vol. 20. No. 1. pp. 59–65. With 1 map in text. [Pasteur Inst., Tunis.]

ii. Colas-Belcour (J.). Notes sur la faune parasitologique des oasis de Tozeur et Kébili. [**Notes on the Parasitic Fauna of the Oases of Tozeur and Kébili (S. Tunisia).**]—*Ibid.* pp. 66–72. [17 refs.]

i. A meagre account of preliminary explorations in Southern Tunisia, in search of fleas and their rodent hosts, in the unfavourable winter season. A list of fleas caught is given; but very few rodents were at home when their burrows were visited.

ii. A cursory account of insects and ticks observed in these Tunisian oases at the same unfavourable season. A list of mosquitoes hitherto observed in the neighbouring oases of Jerid and Neftzaoua contains 3 anophelines—*A. hispaniola*, *A. sergenti*, and *A. multicolor*.

A.A.

STEPANOV (I.). Les rats et les souris de Batoum. [**The Rats and Mice of Batoum.**]—*Rev. Microbiol., Epidémiol., et Parasit.* 1931. Vol. 10. No. 1. pp. 83–92. With 2 text figs. [In Russian. French summary p. 92.] [Quarantine Lab., Batoum.]

The quarantine laboratory of Batoum in 3 years has examined 4,451 rats and 2,075 mice. The rats are *R. norvegicus*, 96·10 per cent.; *R. rattus*, 3·30; and *R. alexandrinus*, 0·60; they pullulate most in spring and autumn; 14,097 fleas were taken from them, 64·6 per cent. being female. The fleas are *Xenopsylla cheopis*, 20·5 per cent. (but in August and September more than 50 per cent.); *Ceratophyllus fasciatus*, 19·9 per cent.; *Leptopsylla musculi*, 64·3; cat and dog fleas, 1·3 per cent. The mice are all *M. musculus*; their fleas number but one-tenth of those of the rats; the species are *X. cheopis*, 6·5 per cent.; *C. fasciatus*, 9·8; *L. musculi*, 83·7. Neither rat nor mouse of those examined was infected with plague.

A. A.

FOX (Carroll). **A Limited Rat Flea Survey of Savannah, Ga.**—*Public Health Rep.* 1931. Mar. 13. Vol. 46. No. 11. pp. 574–575.

The survey was made in Savannah, Georgia, U.S.A. The rats were caught in cage-traps, and were taken to the laboratory in the (uncovered) traps, alive. Besides the fleas specified below there were found the rat-louse *Polyplax spinulosus*, and 4 species of rat-mites, *Laelaps echidninus*, *L. hawaiiensis*, *Liponyssus bacoti*, and *Hoplopleura acanthopus* (the last apparently accidental).

TABLE I. First part of survey, January 27 to March 31, 1927.

| No. of rats: *R. norvegicus* | No. of fleas | Fleas per rat | *Xenopsylla cheopis* | | *Ceratophyllus fasciatus* | | *Leptopsylla musculi* | | *Echidnophaga gallinacea* | | *Ctenocephalides canis* and *felis* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | No. per rat | Total | No. per rat | Total | No. per rat | Total | No. per rat | |
| 387 | 1,764 | 4·6 | 891 | 2·3 | 361 | 0·9 | 460 | 1·2 | 52 | 0·13 | 5 |

TABLE II. Second part of survey, September and October, 1927.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 500 | 4,097 | 8·2 | 3,599 | 7·2 | 22 | 0·04 | 355 | 0·71 | 117 | 0·23 | 4 |

A. A.

CARRIÓN (A. L.). **Final Report on a Rat-Flea Survey of the City of San Juan, Porto Rico.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. Mar. Vol. 6. No. 3. pp. 273–282. With 5 charts. [3 refs.] [Health Dept., Porto Rico.]

This survey was continued for three years. Live rats caught 1,005, *Mus norvegicus* 72 per cent., *M. rattus* 13 per cent., *M. alexandrinus* 15 per cent. Fleas captured 7,145 (on 57 per cent. of the rats=rat-flea

index 7·1) of which 98·5 per cent. were *Xenopsylla cheopis*. The rats were concentrated at the water front and in the residential area, and the flea-index was highest (14) in the dock-rats.

A. A.

Roubaud (E.). Invasion domiciliaire spontanée produite par la puce des rongeurs indigènes, *Ceratophyllus fasciatus* Bosc. [**Spontaneous House Invasion by Rat-Fleas** (*Ceratophyllus fasciatus* **Bosc.**).]—*Bull. Soc. Path. Exot.* 1931. May 13. Vol. 24. No. 5. pp. 383–384. [1 ref.]

Although Bacot thought that *Ceratophyllus fasciatus* was, probably, greatly to be feared in epidemics of plague, others have considered it to be a flea that keeps strictly to rat-holes and is therefore not likely to convey infection to man. Roubaud refers to a house in Groningen which Kapsenberg found to be greatly infested with *C. fasciatus*, the infestation being concurrent with an abnormal mortality of rats, but the fleas most strangely disregarding man. He also mentions a case in his own experience where *C. fasciatus* was found all over a certain house, which was not known to be infested with rats and had not any rat-holes near it; as the fleas in this house had no antipathy to man, and showed a particular fondness for children, Roubaud shares Bacot's mistrust of the breed.

A. A.

Sikes (Enid K.). **Notes on breeding Fleas, with Reference to Humidity and Feeding.**—*Parasitology.* 1931. Apr. Vol. 23. No. 2. pp. 243–249. With 1 chart. [4 refs.] [School of Hyg. & Trop. Med., London.]

A competent physiological study on the larva of *Ceratophyllus wickhami*. The larvae require 15 to 28 per cent. of water in their food. At a constant temperature a relative humidity of 80 per cent. gave the best results among new-hatched larvae fed on different substances at varying humidities. They will eat a great variety of stuff, but dried blood is a convenient food in the laboratory.

A. A.

Roubaud (E.). Prédominance de *Synosternus pallidus* Taschenb. (*Xenopsylla pallida*) comme puce domestique, dans certaines régions pesteuses du Sénégal. [**Predominance of** *Synosternus pallidus* **Taschenb.** (*Xenopsylla pallida*) **as a Domestic Flea in Certain Plague Areas of Senegal.**]—*Bull. Soc. Path. Exot.* 1931. July 8. Vol. 24. No. 7. pp. 551–554. With 3 text figs. [3 refs.]

Attention is drawn to the striking prevalence of *Synosternus pallidus* (Taschenb.) = *Xenopsylla pallida* in certain parts of Senegal as the domiciliary flea there. The species is known to be common on various mammals in Egypt and the neighbouring Sudan, occurs in Tunis, and must have a wide distribution since it is known also in Brazil and in Russia. Synosternus has been separated from Xenopsylla because the metasternum is not subdivided by a horizontal suture.

A. A.

Buxton (P. A.). **The Thermal Death-Point of** *Rhodnius* (*Rhynchota, Heteroptera*) **under Controlled Conditions of Humidity.**—Reprinted from *Jl. Experim. Biol.* 1931. July. Vol. 8. No. 3. pp. 275–278. With 1 text fig. [4 refs.] [School of Hyg. & Trop. Med., London.]

The author wishes to determine precisely the conditions of temperature and humidity that are fatal to an insect—whether evaporation

into dry air cools the creature so that it can survive higher temperature than it can in moist air ; or kills it by undue abstraction of moisture ; or whether humidity has little effect even at nearly fatal temperature. The insect used for experiment was the unfed larva of the Reduviid bug, *Rhodnius prolixus*, between 3 and 7 days old. Experiments showed that the temperature that is fatal to this tiny insect is not, or little, affected by atmospheric humidity ; at all the humidities death took place within half-a-degree of 43° C. at an exposure of 1 hour, and within about half-a-degree of 40° C. on an exposure of 24 hours ; at any one humidity the range of temperature between that fatal to all larvae in a batch and that fatal to none was about 1·5° C., but greater inconsistency occurred when the relative humidity was 0 per cent. At exposures for 5 minutes (relative humidity not stated) death occurred within half-a-degree of 47° C.

The author would like to get in touch with others who are interested in the effects of temperature on insects, under controlled conditions of humidity.

A. A.

Del Ponte (Eduardo). Catálogo descriptivo de los géneros *Triatoma* Lap., *Rhodnius* Stal. y *Eratyrus* Stal. [**Descriptive Catalogue of the Genera *Triatoma* Lap., *Rhodnius* Stal. and *Eratyrus* Stal.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1930. Nov. Vol. 5. No. 8. pp. 855–937. With 13 coloured plates & 25 text figs. [2 pages of refs.]

The catalogue is on classical lines, giving besides a full description (or a diagnosis) the original reference, necessary synonymy, and geographical distribution of each species. There are numerous figures in the text, 13 fine coloured plates, and a bibliography.

A. A.

Liggett (Harold). **Parasitic Infestation of the Nose.**—*Jl. Amer. Med. Assoc.* 1931. May 9. Vol. 96. No. 19. pp. 1571–1572. With 1 text fig. [4 refs.] [Laryngol. Dept., Univ., & Med. College, Bellevue Hosp., New York.]

Whatever other parasites may have been there, the offending ones in this case were living larvae of the Dermestid carpet-beetle *Attagenus piceus* (identified by J. M. Aldrich, curator of insects, Washington). The patient was a girl of 15 coming for treatment for much nasal discharge, hawking of pus, and persistent headache usually supraorbital, occasionally occipital ; in the history 6 or 7 small white "worms" had once been discharged 3 or 4 months before and at intervals living dark brown insects with legs. She remained under examination, treatment and observation for more than 9 months. The history of treatment is mainly surgical. It necessitated the exploration of both maxillary antra and of the sphenoid sinus, and the removal of the right turbinate bone. The right antrum (only) was found full of polypi, necrosed tissue and pus. Neither eggs nor insects were found at the operations, but during the following 2 or 3 weeks of periodic irrigations of the affected cavities one or two living larvae of the carpet-beetle followed each ablution. Subsequently the nasal cavities and the sinuses were filled (by the displacement method of Proetz) with nasal oil (Coakley formula). The reminder is added that the larval stage of the carpet-beetle lasts two years.

A. A.

Pawlowsky (E. N.) & Stein (A. K.). Experimentelle Untersuchung ueber die Wirkung des Bisses der Walzenspinne *Galeodes araneoides* auf den Menschen. [**Experimental Test of the Effect of the Bite of the Spider** *Galeodes araneoides* **on Man.**]—*Ztschr. f. Parasitenk.* 1930. Dec. 17. Vol. 3. No. 1. pp. 8–16. With 3 text figs. [26 refs.] [Military Med. Acad. & State Inst. for Med. Science, Leningrad.]

Another confirmation of the fact that Galeodes notwithstanding its formidable appearance is not venomous or really hurtful to man.

A. A.

Pinto (Cesar) & di Primio (Raul). Contribuição para a biologia dos *Ixodidae* do Estado do Rio Grande do Sul (Brasil). [**Contribution to the Biology of Ixodidae in Rio Grande do Sul (Brazil).**]—*Rev. Med.-Cirurg. do Brasil.* 1931. July. Vol. 39. No. 7. pp. 236–239. With 1 graph in text & 3 figs. on 2 plates.

An investigation was begun in December 1930 to determine what ticks were parasitic for man and domestic animals in Rio Grande do Sul, what species transmitted or were suspected of transmitting disease, their intermediate hosts and their distribution. So far the authors have found three specimens of Ixodinae—*Boophilus microplus*, *Amblyomma ovale*, and *A. maculatum*—and one of the Argasinae, *Ornithodorus brasiliensis*. The first is particularly common in municipalities which are named. The two species of Amblyomma are found on the dogs in Cacimbinhas municipality. *Ornithodorus brasiliensis* is found in the loose soil round dwellings and in and about byres; it is the colour of the ground and when disturbed draws in its legs and is very difficult to distinguish from the fragments of earth. It is very resistant to cold and lives through the winter of São Francisco de Paula where the thermometer not infrequently registers –8° C. in June–August. Its bite produces in man a local itching with erythema and papule formation, together with, in some cases, rise of temperature, headache and dyspnoea. A further report on its pathogenicity is promised.

H. H. S.

Matheson (Robert). **Note on the Tick** *Ornithodorus talaje* **(Guér.-Mén).**—*Parasitology.* 1931. Apr. Vol. 23. No. 2. p. 270.

A lady resident of Ransomville (New York) sends the author a "kind of bug" of which she states that, since she first noticed the kind three years before, she has found at least one specimen crawling on the wall in every room and in the hall of her house there. The bug turns out to be *Ornithodorus talaje* (confirmed by Nuttall and Warburton).—[A species of rather enigmatic distribution, but having according to Dunn the habits of the bedbug, and, as the author says, normally occurring in warm climates]. The lady's family brought from Texas 16 years ago some bedroom furniture that had been stored there for a year.

A. A.

Philip (Cornelius B.). **Occurrence of a Colony of the Tick Parasite** *Hunterellus hookeri* **Howard in West Africa.**—*Public Health Rep.* 1931. Sept. 11. Vol. 46. No. 37. pp. 2168–2172. With 1 chart in text. [5 refs.]

Hunterellus is a minute Hymenopteron parasite of ticks, apparently of wide occurrence in America and also observed in Portuguese E. Africa and also, as now reported, at Lagos, where it was noticed only on

*Rhipicephalus sanguineus*. Of 321 replete nymphs of this species examined on 30th September, 231 showed exit-holes of the parasite, 60 still contained parasites, and 30 were shrunken and had no signs of a parasite.

A. A.

Hirst (Stanley). **On the Larval Trombidiid Mite** (*Trombicula hirsti* **L. Sambon) that causes the " Scrub Itch " of Northern Queensland and the Coorong, South Australia.**—*Trans. & Proc. Roy. Soc. South Australia.* 1929. Vol. 53. pp. 24–26. [2 refs.] [Zool. Dept., Univ., Adelaide, S. Australia.]

*Trombicula hirsti* described as larva of a new species of harvest-mite by Sambon (Ann. Mag. Nat. Hist. (9) xx. 1927, p. 157) is here briefly redescribed by Hirst, who is inclined to regard it as identical with the *Trombicula pseudo-akamushi* of Hatori. It has various local names—scrub itch mite, tea-tree itch mite—in different parts of Australia, where it is extremely abundant during the hot season and is then a cause of an irritating dermatitis. [*T. hirsti* is one of the numerous mites referred to by Sambon again in 1928, see this *Bulletin*, Vol. 25, p. 833].

A. A.

Shelmire (Bedford) & Dove (Walter E.). **The Tropical Rat Mite,** *Liponyssus bacoti* **Hirst, 1914 : the Cause of a Skin Eruption of Man, and a Possible Vector of Endemic Typhus Fever.**—*Jl. Amer. Med. Assoc.* 1931. Feb. 21. Vol. 96. No. 8. pp. 579–584. With 5 text figs. [5 refs.] [Med. College, Baylor Univ., Dallas, Texas.]

This is an account in very full detail of about 200 cases of " rat-mite dermatitis " reported from various towns in Texas and caused by *Liponyssus bacoti* (Hirst). The mite is figured, as well as a patient showing " wheals and papules varying in size from that of a pinhead to that of a pea " scattered like an exanthema all over the back and nape. The female mite when replete leaves her host and takes shelter in a crevice, where she lays 3 to 8 eggs, which hatch in 4 to 6 days. The larvae die if they do not find a host within 12 days. Finding a host (rat or mouse) they remain attached for about 2 days and then drop off to moult. There are said to be 4 or 5 feeds with intervening moults before the adult stage is attained, and that this succession of events may occur on the same host or on several hosts. On man an adult mite may take several feeds. When bites are very numerous the patient may have transient fever. Concurrently with rat-mite dermatitis endemic typhus fever made its appearance in northern and eastern Texas and the authors suggest that the mites (*Liponyssus bacoti*) may be the carriers of the infection.

A. A.

Wilbert (R.) & Delorme (M.). " Pastoria ", centre de recherches biologiques et d'élevage de singes, Institut Pasteur de Kindia, Guinée française. [**" Pastoria," Biological Research Centre and Simiary, Pasteur Institute of Kindia, French Guinea.**]—*Bull. Soc. Path. Exot.* 1931. Feb. 11. Vol. 24. No. 2. pp. 131–148.

[Introductory part by M. Wilbert. Pathology by M. Delorme.]

The organization of " Pastoria " the institution in French West

Africa for the preservation, propagation, and scientific investigation of the Ape and Monkey Kind—has already been noticed in this *Bulletin* (Vol. 21, p. 672); in the present paper we find some account of the behaviour and psychology and of the pathology of its simian community, prefaced by some trenchant animadversions against the barbarities practised by those who catch our humble fellow-Primates for the market, and an appeal for some State control of that ignoble trade.

The simian inmates of the institution are mainly chimpanzees, but also include species of Colobus, Papio (Cynocephalus), Cercocebus, and Cercopithecus. Chimpanzees are for the most part kept in progressive liberty, under the surveillance of keepers who walk them out, in orderly schools of 10 to 15, or even 30, for daily exercise and play in the forest, where they are allowed to climb in some big tree and to skylark with each other and with their keepers in some clearing. Thus they get accustomed to human society, and come to regard man as a friend, and at the same time learn the great lesson of obedience—the lesson that of late has become so musty among some of the reforming teachers of the young of our own species. For about the first four or five months of its life the young chimpanzee is a nursling, but at seven or eight months it begins to be inquisitive about stronger food. At 5 or 6 years it is making sounds and gestures of an intelligent, purposive and imitative kind, is impulsive and capricious like a child, shows fear and sympathy, and can be angry. A little before the age of 10 the sexual instincts begin to show. At about 30 years of age the chimpanzee is an old man, and his younger fellows let him know that even in the unsophisticated chimpanzee community "Crabbed Age and Youth cannot live together". His body is bent, his face wrinkled, his limbs are crocked, and his nails brittle and broken—a sorrowful picture.

Specialists in mental disease would find much instructive study in the chimpanzee. The author mentions a case of extravagant mental derangement associated with symptoms very much like general convulsive tic in a young male about 7 years old.

The lower, non-anthropomorphoid, monkey species do not have the same liberty as the chimpanzees, and indeed are not worthy of it; but they have specially large cages, partly in the open air, partly protected from weather, for exercise and amusement, as well as smaller cages for resting and refreshment.

The diseases observed include the following: A very virulent dysentery, due to a filter-passing virus and sometimes epizootic, in chimpanzees and communicable also to *Cercopithecus callitrichus*. A fusospirillar infection, also in chimpanzees, which at first is localized in the mouth and pharynx but may spread to the respiratory tract, or to the alimentary where it may cause a pseudomembranous enteritis with lesions strikingly like those of Vincent's angina; in the mouth also it may sometimes lead to necrosis of jaws and palate which may be followed by serious general mischief. The intestinal parasites observed are *Oesophogostoma watsoni*, *Necator americanus*, *Trichuris trichiura*, *Strongyloides stercoralis*, *Enterobius vermicularis*, *Watsonius watsoni*, and *Porocephalus armillatus*; the blood parasites are *Microfilaria perstans* and a Plasmodium somewhat resembling *P. vivax*, both of them in the chimpanzee and *C. callitrichus*. The "marvellous" preventive efficacy of the B.C.G. antitubercle vaccine, whether administered by mouth or subcutim, has been demonstrated. Both

chimpanzee and *C. callitrichus* (but not the other monkeys) have proved susceptible to the virus of herpes and to neurovaccine (as also have two species of civet cats). A Cercopithecus was proved to be susceptible to a human infection of *Trypanosoma gambiense.*

Other pathological observations here recorded have no concern with apes or monkeys ; they relate to an epidemic of rabies in Kindia ; to outbreaks of avian typhus and avian cholera in fowls ; and to co-operation in an antilocust compaign.

In the sequel M. Marcel LEGER, to illustrate simian psychology, tells the sad story of a large black mother chimpanzee captured, with her dying baby in her arms, in her native land. For hours after the death of the nursling she emitted heartrending cries whenever its dead body was brought to her, and her signs of grief were afterwards plangent whenever the young of her kind passed her cage. In course of time this mother, being considered too dangerous for employment, was sentenced to the poison-cup ; but she would not touch either orange or banana into which strychnine had been delicately injected, although she would take a good fruit even if it had been broached.

A. A.

GAIDE. Note sur un poisson toxicophore du Tonkin le " Ca-Noc ". [**Note on the " Ca-Noc," a Toxic Fish of Tonking.**]—*Bull. Soc. Méd. Chirurg. Indochine.* 1931. Mar. Vol. 9. No. 3. pp. 150–152. With 1 coloured plate.

Description with coloured figure of the *Ca-Noc,* a well known globe-fish of the Tetrodon genus, poisonous as food. The author speaks of three " varieties " of this fish in Annam—two in fresh water and one marine. The poison is particularly abundant in reproductive glands, liver, intestine and head. Nothing is said here about the acute gastro-intestinal irritation that usually follows eating other species of Tetrodon, although emetics and purgatives and stomach-pump are mentioned in treatment ; but emphasis is given to the alternating paroxysms of convulsions and collapse that occur in bad cases. Three such cases are briefly noticed, one of which treated as for mushroom-poisoning, recovered.

A. A.

VELLARD (J.). Venin des raies (Taeniura) du Rio Araguaya (Brésil). [**The Venom of Rays (Taeniura) of the River Araguaya (Brazil).**]—*C.R. Acad. Sci.* 1931. May 18. Vol. 192. No. 20. pp. 1279–1281.

Two species of sting-rays of this genus are common in the Araguaya and its tributaries. Wounds inflicted by their venomous spines are extremely and persistently painful, numbing and paralysing a limb and causing much local swelling that goes on to destructive necrosis. Such accidents are common, but are rarely fatal.

The author's experiments on animals were made both by using the fresh spine as a weapon and by injecting watery or saline or glycerine extracts of the tissue that fills its groove ; such extracts are weak and very soon lose their activity. Injections into muscle or subcutim cause, besides pain, local muscular contractions, tremors and even general chronic convulsions. Mortal doses are quickly followed after pain and excitement by feeble paralysis, disappearance of reflexes, and death. After non-mortal doses, besides the local effects described at the outset, progressive

atrophy of the injected limb may follow. In all animals (mammals, birds, reptiles, batrachia) respiratory troubles are a constant and early feature, and also increased secretion, salivary, nasal and lacrymal (in the toad, only a general exudation of its venom). The dog generally succumbs to a wound from a venom-spine. The toxins of the venom are destroyed by 5 minutes boiling, by strong acids, and by alcohol.

A. A.

VELLARD (J.) & VIANNA (M. Miguelote). Pesquizas experimentaes sobre o veneno do sapo commum do Brasil (*Bufo marinus* Linn.). (1ª memoria.) [**Experimental Study of the Venom of** *Bufo marinus* **Linn. the Common Toad of Brazil. Part I.**]—*Mem. Inst. Oswaldo Cruz.* 1931. Feb. Vol. 25. No. 1. pp. 1–46. With 27 figs. on 12 plates. [18 refs.] French summary. [Bios Inst., Nictheroy, Brazil.]

A fine experimental [and historical] study. By whatever route introduced the venom of *Bufo marinus* had the same effect on all the experimental animals—cat, dog, guineapig, rabbit, horse, pigeon, snakes, lizards, batrachia, fish, and certain crustacea and insects. There is an initial phase of excitation (heart, lungs, lacrimal and salivary secretion followed by convulsions, and a phase of depression and paralysis with gradual failure of breathing and stoppage of the heart. When introduced subcutim there is also much oedema and local haemorrhage, followed by foetid gangrene. Introduction into the conjunctival sac or the nasal or buccal mucosa causes local ischaemia and anaesthesia followed by dolorous congestion and hyper-secretion, and in the case of the eye perhaps panophthalmia. By whatever method injected the poison " accumulates ", and initial anaphylaxis occurs at each fresh injection. At autopsy, if death has been quick, there are found endothelial and visceral haemorrhages, cardiac infarcts, and perhaps pulmonary oedema ; and if slow, much perivascular inflammation in liver, spleen, kidneys, and medulla.

A. A.

DE MAGALHÃES (Octavio). Escorpionismo com duas observações de accidente pela picada do *Tityus serrulatus* (Lutz et Mello, 1922). [**Scorpion Sting with Description of Two Cases.**]—*Rev. Med.-Cirurg. do Brasil.* 1931. June. Vol. 39. No. 6. pp. 190–194. With 3 figs. on 2 plates. [Ezequiel Dias Inst., Bello Horizonte, Brazil.]

Studying the question of the effects of scorpion stings the author has noted the marked proteolytic action of *T. serrulatus* as compared with *T. bahiensis*. Other important symptoms occasionally present are fall of temperature as low as 35° C. (5 times out of 161 cases observed), coming on even in an hour or so if the poison is injected into a vein, vasomotor paralysis evidenced by dilatation of the pulmonary vessels and subacute oedema of the lung, tremors and marked drowsiness.

The first case here recorded was a man of 21 years stung on the middle finger of the right hand by a scorpion hidden among some bricks. There was immediate acute pain extending to the axilla, where an adenitis developed. The finger began to swell 3 days after the prick, necrosis set in and the finger had to be amputated ; local treatment and the use of compresses of scorpion antivenin were ineffectual. The second patient was a boy of 15 years, stung twice on the inner surface of the right thigh when he was asleep. Pain was severe and he vomited a clear viscid fluid and the mouth and nostrils " filled with water ", he had intense headache, attacks of shivering, temperature 37·5° C., pulse 98, irregular, and a

glycosuria [amount not stated] which passed off in 48 hours. The scorpion in each case was *T. serrulatus* and both patients recovered. The author has collected accounts of 161 cases and 40 deaths from scorpion stings.

H. H. S.

Regendanz (P.) & Reichenow (E.). Ueber Zeckengift und Zeckenparalyse. [**Tick-Venom and Tick-Paralysis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. May. Vol. 35. No. 5. pp. 255–273. With 3 text figs. [10 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The authors relate and discuss their experiments with the venom of a very widely distributed tick, *Rhipicephalus sanguineus*, and in rather over-cautious language they express their opinion that the results throw some light on the cause of Tick-Paralysis. Their conclusions are as follows: The venom is formed when the eggs are developing, and accumulates chiefly in the ovarian eggs (the experiments on animals were made with such eggs). Neither the larvae nor the adult female before she has tasted blood contain it in any appreciable quantity. Its properties are comparable with those of other Arachnoid venoms. It was very active when introduced into the animals tested—dog, rabbit, guineapig, rat, mouse, and canary—causing a progressive motor paralysis resembling the disease "described as tick-paralysis"; in fact "the venom of tick-paralysis is evidently identical with the venom of Rhipicephalus eggs". The results (subcutaneous or peritoneal introduction) were not immediate, but in the course of a few days the paralysed animals died, and exhibited extensive degenerative processes of the central nervous system. A few [unpropitious but not quite decisive] experiments, on dogs, on the question of acquisition of immunity through graduated doses of the venom, are recorded.

A. A.

i. Arthus (Maurice). Les anavenins. (Deuxième mémoire.) Immunisation par les anavenins. [**Anavenins. Fasc. II. Immunization by Anavenins.**]—*Jl. Physiol. et Path. Gén.* 1930. Dec. Vol. 28. No. 4. pp. 773–788.

ii. ——. Les anavenins. (Troisième mémoire.) Anaphylaxie engendrée par les anavenins. [**Fasc. III. Anaphylaxis engendered by Anavenins.**]—*Ibid.* pp. 800–815.

i. Since formolized snake-venoms are innocuous and antigenous they may justly be homologated with anatoxins and be called anavenins. Like anatoxins they have immunizing properties—which are particularly conspicuous in anacobra-venin—after several successive subcutaneous injections (into rabbit). The antigenous powers are really the property of the anavenin, and are not due to a minute quantity of venom remaining unchanged in the anavenomous liquid. This paper contains in full detail the evidence upon which these generalizations and their qualifications are based.

ii. An exaggerated (proteotoxic) anaphylactic shock—shown in long and lasting arterial depression and accelerated breathing—is one of the phenomena engendered by the intravenous injection of venom of cobra or of Crotalus into rabbits previously sensitized by anacobra-venin or anacrotalus-venin. This anaphylaxis engendered

by anavenins is no more specific than that engendered by venoms, and very minute quantities of anavenins can bring it about. The experiments are described and tabulated in this paper.

A. A.

MHASKAR (K. S.) & CAIUS (J. F.). **Indian Plant Remedies used in Snake-Bite.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1931. Jan. Memoir No. 19. 96 pp. [42 refs.] [Haffkine Inst., Bombay.]

"From time to time 'infallible cures', 'certain antidotes', and 'never-known-to-fail remedies' [for snake-bite] are sent to me from all parts of the world to be submitted to the crucial test of experiment, always with the same result—utter failure". So wrote Vincent RICHARDS in 1886.

"The words quoted above", say the authors in their second paragraph, "might be placed on the lips of any one of the Directors of the Haffkine Institute, and they would very nearly sum up their experience during the period beginning October 1896 and ending July 1930." And this is their verdict after having tested "314 individual plants and 184 combinations": "We have every reason to believe that our work is exhaustive, and we may safely conclude that none of the Indian plants recommended for the treatment of snake-bite has any preventive, antidotal, or therapeutic effect."

In their tests the experimental animal was always the stray dog—unless otherwise stated—from 6 to 12 kilograms. Each test necessitated the use of four animals, two for colubrine (cobra) and two for viperine (Russell's viper) venom; the dose of venom was calculated so as to give a lease of life of not less than two hours; the dosage of the "remedy" to be tested was (wherever possible) that indicated in the literature at the authors' disposal, in other cases they were calculated from the therapeutic data available.

The list of medicinal plants, indigenous or imported, used in the treatment of snake-bite includes 322 species arranged alphabetically by their botanical names. The more commonly known sanskrit name of those mentioned in Ayurveda literature is also given. The descriptive detail allotted to each species varies of course, it usually includes a short description of the plant, its geographical distribution, its properties, and the parts used in the treatment, and the manner of their preparation and administration. Following the list of plants there is a list of Ayurvedic preparations used in the treatment of snake-bite.

The introduction to the paper takes notice of a few instances of remedies taken from the records of the last twenty years. They illustrate the philosophy of Carlyle's essay on Morrison's Pill rather than the progress of scientific medicine.

A. A.

STILES (C. W.) & HASSALL (Albert). **Key-Catalogue of the Crustacea and Arachnoids of Importance in Public Health.**—*Hyg. Lab. Bull. No. 148.* Washington. 1927. Apr. pp. iv+197–289.

This is an index expurgatorius of Crustacea, Arachnida, and Myriapoda that distress Man when ingested as food, and as mechanical polluters of food, and as parasites and intermediary hosts of parasites,

and as inflicting wounds, and as having dangerous venomous properties, and as being found in graves or on corpses ; and it also includes those few that have a minor use in therapeutics. It is a " key-catalogue " and reeks of the midnight oil and the syncoptical apparatus of the librarian ; it is itself the quintessence of abstraction and abridgement.

A. A.

Faust (Ernest Carroll). **The Nosogeography of Parasites and their Hosts.**—*Porto Rico Jl. of Public Health & Trop. Med.* 1931. June. Vol. 6. No. 4. pp. 373–380. With 2 figs. [Dept. of Trop. Med., Tulane Univ., New Orleans.]

A good general lecture at the School, on natural conditions and circumstances that influence the dispersal and the circumscription of animal parasites.

A. A.

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Baisas (F. E.). The Barbirostris-hyrcanus Group of the Philippine Anopheles.—*Philippine Jl. Sci.* 1931. Apr. Vol. 44. No. 4. pp. 425–448. With 7 text figs. & 3 plates. [49 refs.]

Barraud (P. J.). Notes on Some Indian Mosquitoes of the Subgenus *Stegomyia*, with Descriptions of New Species.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 221–228. With 18 figs. on 1 plate. [2 refs.]

Barraud (P. J.) & Christophers (S. R.). On a Collection of Anopheline and Culicine Mosquitoes from Siam.—*Records of the Malaria Survey of India.* 1931. June. Vol. 2. No. 2. pp. 269–285. [11 refs.]

Christophers (S. R.) & Puri (I. M.). Species and Varieties of the *funestus* Series of Anopheles.—*Records of the Malaria Survey of India.* 1931. Sept. Vol. 2. No. 3. pp. 481–493. With 2 text figs. [7 refs.]

Covell (G.). The Distribution of Anopheline Mosquitoes in India and Ceylon : Additional Records, 1926–1930.—*Records of the Malaria Survey of India.* 1931. June. Vol. 2. No. 2. pp. 225–268. [6 pages of refs.]

Curry (Dalferes P.). *Anopheles* (*Anopheles*) *neomaculipalpus* [*sic*]. A New Species of the *Arribalzagaia* Group of *Anopheles* from Panama.—*Amer. Jl. Hyg.* 1931. Mar. Vol. 13. No. 2. pp. 643–647. With 1 text fig. [2 refs.] [Gorgas Memorial Lab., Panama.]

Evans (A. M.). Notes on African Anophelines.—*Ann. Trop. Med. & Parasit.* 1931. Mar. 31. Vol. 25. No. 1. pp. 129–143. With 6 text figs. [7 refs.]

Gabaldon (Arnoldo). Nota sobre distribución de protozoos intestinales basada en el examen de 2.000 muestras.—*Gac. Med. de Caracas.* 1930. Dec. 15 & 31. Vol. 37. Nos. 11 & 12. pp. 165–169 ; pp. 181–190. [60 refs.]

Ince (H. T.). A Case of Acute Pulmonary Oedema in an Adult, as the Result of a Scorpion Sting.—*Indian Med. Gaz.* 1931. Apr. Vol. 66. No. 4. pp. 200–201.

Khaw (O. K.) & Hoeppli (R.). Ekto- und Endoparasiten chinesischer Bettler in Peiping.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Aug. Vol. 35. No. 8. pp. 443–448. [6 refs.] [Peiping Union Med. College, Peking.]

Kurup (P. K.). A Case of Myiasis of the Nasal Fossa.—*Indian Med. Gaz.* 1930. Aug. Vol. 65. No. 8. p. 450.

Loize (Harald). Die künstliche Proteosomainfektion der Vögel. Ein Beitrag zur Frage der Immunität und Immunisierung bei Vogelmalaria. II. Mitteilung.—*Zent. f. Bakt.* I. Abt. Orig. 1931. Feb. 23. Vol. 120. No. 1/2. pp. 107–113. [5 refs.] [Hyg. Inst., Univ., Greifswald.]

Nieschulz (Otto). Ueber Luftfeuchtigkeit in Insektenzuchtzimmern.—*Zent. f. Bakt.* I. Abt. Orig. 1931. Vol. 121. pp. 519–520. [Inst. for Parasit. & Infect. Diseases, Reich Univ., Utrecht.]

Nieschulz (Otto) & Bos (A.). Einige Versuche mit überwinternden Exemplaren von *Culex pipiens*.—*Zent. f. Bakt.* II. Abt. 1931. Vol. 84. pp. 364–368. [6 refs.] [Inst. for Parasit. & Infect. Diseases, Reich Univ., Utrecht.]

Nitzulescu (Georgette) & Nitzulescu (Virgil). Essai de table dichotomique pour la détermination des phlébotomes européens.—*Ann. Parasit. Humaine et Comparée.* 1931. Mar. 1. Vol. 9. No. 2. pp. 122–133. With 15 text figs. [20 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Nitzulescu (Virgil). Sur la présence en Yougoslavie du *Phlebotomus perniciosus* var. *tobbi* Adler, Theodor et Lourie, 1930.—*Ann. Parasit. Humaine et Comparée.* 1931. May 1. Vol. 9. No. 3. pp. 266–270. With 4 text figs. [5 refs.] [Parasit. Lab., Faculty of Med., Paris.]

Schevtschenko (F. J.). Die Artmerkmale der Larven von *Phlebotomus papatasii*, *Phl. chinensis*, *Phl. sergenti* und *Phl. caucasici* (Marzinovsky) s. li (Popoff).—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Sept. Vol. 35. No. 9. pp. 526–537. With 16 text figs. [San. Bact. Inst., Tashkent.]

Schwetz (J.). Note préliminaire sur les moustiques de quelques régions de la province orientale (Congo Belge).—*Ann. Soc. Belge de Méd. Trop.* 1930. Dec. 31. Vol. 10. No. 4. pp. 429–438. [4 refs.]

Senior-White (Ronald). A New Biting Ceratopogonine from India.—*Arquivos da Escola Méd.-Cirurg. de Nova Goa.* Ser. A. 1931. No. 6. pp. 713–714. With 9 figs. on 1 plate.

Shannon (Raymond C.) & Frobisher (Martin), Jr. A Comparison of the Effect of Various Substances upon Larvae of *Aedes aegypti*.—*Amer. Jl. Hyg.* 1931. Sept. Vol. 14. No. 2. pp. 426–432. [2 refs.] [Yellow Fever Lab., Internat. Health Division, Rockefeller Foundation, Bahia, Brazil.]

Sinton (J. A.). *Phlebotomus stantoni* Newstead, 1914 and Some Other Siamese Sandflies.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 99–106. With 12 figs. on 1 plate. [11 refs.]

Sinton (J. A.). Notes on Some Indian Species of the Genus *Phlebotomus*. Part XXIX. *Phlebotomus arboris* n. sp.—*Indian Jl. Med. Res.* 1931. July. Vol. 19. No. 1. pp. 107–112. With 13 figs. on 1 plate. [2 refs.]

Tsuchiya (H.). A Study on Variabilities in Dimensions and Numbers of Discharged Cysts of *Giardia lamblia* (Stiles, 1915) from Day to Day under Normal Conditions.—*Amer. Jl. Hyg.* 1931. Mar. Vol. 13. No. 2. pp. 544–567. With 2 graphs in text. [19 refs.] [Johns Hopkins School of Hyg. & Public Health, Baltimore.]

Vieira (F. Borges) & da Silveira (G. Fleury). Protozoarios intestinaes no homem na cidade de São Paulo.—*Bol. Inst. Hyg. de São Paulo.* 1931. No. 47. 11 pp. Reprinted from *São Paulo Medico.* 1931. Jan. Vol. 2. No. 1. [2 refs.]

## REVIEWS AND NOTICES.

BLACKLOCK (D. B.) [M.D. (Edin.), D.P.H. (London), D.T.M. (Liver.), etc.] & SOUTHWELL (T.) [D.Sc., Ph.D., A.R.C.Sc., F.Z.S., F.R.S. (Edin.), etc.]. **A Guide to Human Parasitology for Medical Practitioners.**—pp. viii+271. With 2 coloured plates & 122 text figs. 1931. London: H. K. Lewis & Co. Ltd. [15s.]

It seems to the reviewer that there is a real need for two kinds of scientific text books only—exhaustive treatises wherein the reader can reasonably expect to discover the present state of knowledge concerning the subjects dealt with; and elementary books which confine themselves to main facts and principles, which are written in simple and possibly even dogmatic language, and are of such reasonable size that they can be mastered by the average student whilst attending one of the recognized courses of instruction. Long experience in teaching all sorts and conditions of students has shown how great is the necessity for both these types of volume, and how often text-books, many of which are of undoubted merit, fail simply because they attempt a compromise between these two ideals: in the words of a student, "They are too much and not enough." To the teacher of Parasitology there is available a number of excellent comprehensive treatises dealing with the various branches of his subject, but to assist him in the instruction of what must inevitably constitute the great mass of his students—the beginners—there is a surprising dearth of suitable text books. For the production of a really good elementary text-book are required not only a wide knowledge of the subject, and prolonged experience in teaching, but also considerable courage, as the work entails much labour and its reward is often the ill-concealed contempt of critics and pedants.

The present volume is, in the reviewer's opinion, a successful attempt to meet what he has long recognized as a very urgent need—a small concise text-book suitable for students commencing a study of Parasitology, and particularly for those who are taking the course of instruction prescribed for the Diplomas of Tropical Medicine and Public Health. The mastery of its contents within a period of three months should be well within the capacity of the average student; and provided the reading is supplemented by practical work in the laboratory, which is of course indispensable, he should at the end of his course have an adequate working knowledge of the subject.

Recognizing the fact that the student must appreciate the zoological relationship of the various animal parasites, if he is to have any clear and lasting conception of the subject of Parasitology, the authors have carefully explained the system of zoological nomenclature and classification, and have arranged their matter according to zoological principles.

In addition to descriptions and life histories of the spirochaete, and the protozoal and helminth parasites of man, the authors have given an account of the methods usually adopted for the examination of blood, faeces, urine and puncture fluids. They have carefully avoided the more elaborate methods, and have confined themselves to simple methods suitable for the practitioner whose duty it is to diagnose and treat tropical diseases.

A notable feature of great value in the volume is the provision of a series of eleven tables which are easy of reference and summarize the information given in the text; one is a revision table of the diagnostic features of all the parasites. The life-histories of the helminth parasites are pictorially represented in a series of diagrams.

Careful elimination of non-essentials, which is required in order to produce a book of this nature, is, as everyone with experience will admit, a very difficult task. It could only be accomplished with any degree of success by persons such as the authors, who have had long experience of

the difficulties which beset students in their studies of the parasites; the fact that both authors have extensive acquaintance with the conditions under which practitioners have to work in the tropics adds great value to their exposition.

The book is beautifully printed and the numerous illustrations are excellent. Both authors and publishers are to be congratulated on the production, at so moderate a price, of a book which is certain to prove invaluable, not only to the student, but to those engaged in the practice of Tropical Medicine.

W. Yorke.

PURI (I. M.). **Larvae of Anopheline Mosquitoes, with Full Description of those of the Indian Species.**—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1931. June. Memoir No. 21. pp. vi+227. With 47 plates. [5 pages of refs.] [Central Research Inst., Kasauli.]

This is a comprehensive, careful, and judicious piece of work by an observer who knows the larvae of the Indian anophelines in their natural waters as well as in the laboratory, and is equally conversant with their parents. Fifteen pages are given to bionomy—habitats and provenance, habits, food and manner of feeding, moulting and term of larval life—and to all the technique of study. A very precise and particular description of the surface anatomy of the full-grown larva of the fourth (final) stage and a critical account of each of the three preceding stages, together with a brief notice of some not uncommon abnormalities, occupy 34 pages. The subject and the schemes of classification are dealt with in 33 pages, the 44 Indian species (and also certain varieties) are described in 158 pages, and the text concludes with 5 pages of references.

With regard to classification of anopheline larvae the author is admirably judicious. He is satisfied that those studied by himself can be segregated on larval characters in groups that " more or less correspond " with the generally accepted classification of adults, and he is content with the rational declaration that " for any classification of this tribe [Anophelini] to be really adequate, the characters of the larvae will have to be considered along with those of the adults." In the identification of the different species of anopheline larvae useful characters are found in the arrangement and form of the various hairs of the clypeus and frontal region, of the pleural hairs of the thorax, and of the lateral hair on abdominal segments 3 to 6. By this method anopheline larvae form two Divisions one (A) for the S. American Chagasia, which has only 2 pairs of normally placed frontal hairs and the outer anterior clypeal hair transformed to a stout spine; the other (B) including all other known anopheline larvae, with 3 pairs of frontal hairs forming a line, and a normal outer anterior clypeal hair. The big Division B can be brigaded in four subdivisions, namely: (1) larvae having the inner anterior clypeal hairs set close together, the antennal hair branched, and the long lateral hair of abdominal segments 4 and 5 split into 2 to 5 branches—e.g., *A. maculipennis, A. barbirostris*; (2) those having the said clypeal hairs set fairly close together and the antennal hair branched, but the very long lateral hair of abdominal segments 4 to 6 almost always simple—a section that includes only the ten Tropical American species resembling *A. argyrotarsis* and *A. tarsimaculatus*; (3) those having the antennal hair very short and simple (except *A. asiaticus* which has it split into 3–5 branches), the frontal hairs much reduced and some or all sometimes simple, and the lateral hair of abdominal segments 4 to 6 very long and feathered—e.g., *A. plumbeus, A. barberi*; and (4) those having the inner anterior clypeal hairs set wide apart and the antennal hair very short and simple—a large section that includes most of the Old World species, and is subdivided in 6 groups. Using the characters of the " hairs " and setae the author has devised three synoptic tables for the

identification and correlation of the Indian anopheline larvae—a " simple " table, an " advanced " table, and a table of affinities.

The account of the different species of Indian larvae comprises surface anatomy in very full detail, habitat, provenance, and geographical distribution, the descriptive anatomy being based for the most part on material collected, reared and otherwise handled by the author himself ; also, where necessary, comparative detail and previous descriptions of species. The text is sufficiently illustrated in 47 excellent plates.

A. Alcock.

PURI (I. M.). **Synoptic Tables for the Identification of the Full-grown Larvae of the Indian Anopheline Mosquitoes.**—*Health Bull. No. 16. Malaria Bureau No. 7.* 65 pp. With 79 figs. 1930. Calcutta : Govt. of India Central Publication Branch. [As. 6 or 8d.]

This is a very useful publication. It opens on a very careful description, supplemented by large plain instructive text-figures, of the surface anatomy and adjuncts of the anopheline larvae. Then follow brief practical instructions for collecting and breeding the larvae, and full directions for fixing and preserving and mounting them. There are two separate synoptic tables for identifying the full-grown larvae ; one of them ignores varieties, the other includes them ; both of them are riveted with text-figures. An alphabetical list of all the species of Anopheles found in India, with the commonest breeding-places and the broad geographical distribution of each species forms the conclusion.

A. Alcock.

SENN (Ernst) [Dr. Med.]. **Theodor Bilharz. Ein deutsches Forscherleben in Ägypten 1825–1862.** [Theodor Bilharz. A German Naturalist's Career in Egypt, 1825–1862.]—*Schriften des Deutschen Ausland-Instituts Stuttgart.* Reihe D : Biographien und Denkwürdigkeiten. Band 5. 76 pp. With 17 figs. on 5 plates. 1931. Stuttgart : Ausland und Heimat Verlags-Aktiengesellschaft. [Bound Rmk. 4. ; Unbound Rmk. 3.]

In the middle of the nineteenth century those concerned with the causation of disease were busily engaged in the study of the helminth parasites and their transmission, for the science of bacteriology was for them but as a distant cloud. PRUNER's rediscovery of DUBINI's hookworm had roused suspicions regarding its clinical significance in Egypt and had directed attention to overseas countries as new and fruitful fields of investigation. HERBST had just solved the life history of the Trichina worm by feeding experiments, and this new experimental method was soon to give other sensational results in the successful investigations of KUCHENMEISTER and v. SIEBOLD on the mode of spread of the Taenias.

At this moment a political change of great importance occurred in Egypt. The Francophile Viceroy Mehemed Ali died and his successor Abbas I replaced CLOT Bey and other French administrators and teachers by others of German nationality. The triple post of Director of the Medical School, President of the Sanitary Council and personal Physician to the Viceroy was offered to Dr. GRIESINGER, Professor of Pathology at Kiel and the Chair of Surgery to Dr. REYER of Vienna. GRIESINGER, delighted at the prospect of investigating diseases in an unexplored land, sought an assistant with leanings towards natural history, and his choice fell upon Dr. M. T. BILHARZ a former pupil, then 25 years of age, who had

just completed his medical studies at Tübingen. Before sailing for Egypt, BILHARZ received from another of his teachers, VON SIEBOLD, the advice to investigate the Entozoa of man and the morphology and histology of the electric fish of the Nile, these being the two most promising lines of research at that time. During the first 17 months of their stay in Egypt, GRIESINGER and BILHARZ performed over 400 post-mortems, and within one year BILHARZ was able to send to v. SIEBOLD a long letter describing three new entozoa of man which he wished to name "Haematobium dispar," "Taenia aegyptiaca" and "Distomum intestinale"; but were eventually called *Distomum haematobium*, *Taenia nana* and *Distomum heterophyes*. In further communications during the second year other parasites including the hookworm and the guineaworm, were noted and the relation of the new blood fluke to lesions in the bladder wall were discussed. At that time v. SIEBOLD was editor of the Journal *Zeitschrift für Wissenschaftliche Zoologie*, and in 1853 he published these results in an article compiled from the more important portions of BILHARZ's letters, together with a number of editorial comments. With this publication BILHARZ's helminthological work may be said to have ceased. His chief, GRIESINGER, had not proved a success either as an administrator or as a colleague in the medical community, and in the spring of 1852 had resigned and returned to Europe. BILHARZ was then transferred to the surgical section of the Hospital under Professor REYER and appears to have sought, unsuccessfully, for a medical post on the Red Sea, chiefly in the hope of securing an opportunity to study its little known fauna. The Crimean War in 1854 brought great unrest in Cairo and the Medical School was temporarily closed. In 1855 BILHARZ succeeded to the Professorship of Clinical Medicine but to qualify himself for these new duties he had to abandon for a time the researches on the electric fish on which he had been engaged since 1852. With the death of Abbas I in 1856, the restoration of French influence, the departure of Dr. REYER and the return of CLOT Bey, BILHARZ's position became increasingly difficult but he found a quiet haven in the Professorship of Descriptive Anatomy. In 1858 CLOT Bey, tired in turn of international intrigue, like GRIESINGER and REYER, resigned and the Medical School was for many years afterwards carried on chiefly by native teachers. BILHARZ, after a brief holiday in Europe in 1858, returned to his duties again; but in private practice he had now to make up for the remissness of the Egyptian Treasury, and it was only through the political pressure of the Duke of Coburg-Gotha that, in the spring of 1862, he received arrears of salary for the previous 28 months. A few weeks later he died of typhoid fever at the early age of 37, and was buried at old Cairo.

Of this sadly broken career, Dr. Senn has written a fascinating memoir containing much concerning BILHARZ's personal life and friendships which has hitherto been buried in private correspondence. His story is one of a shy and retiring personality whose worldly ambitions were fulfilled with the satisfaction of few simple needs and whose main interests and consolation in life lay in nature study. His parasitological discoveries were, for BILHARZ, but new and interesting facts in natural history. It remained for later workers to elucidate their fundamental importance in relation to preventive medicine.

One must admire the care and thoroughness with which Dr. Senn has conducted his bibliographical researches and congratulate him on the results. One of the most surprising is the discovery that the generic name *Bilharzia* heretofore attributed to Cobbold 1859 had appeared in a monograph "Mikrogeologie" printed and published in 1856 as a posthumous work of one of BILHARZ's many friends, Dr. MECKEL VON HEMSBACH. Those who regretted the displacement of the generic name *Bilharzia* Cobbold, 1859 by *Schistosoma* Weinland, 1858 under the Law of Priority will rejoice in the restoration of *Bilharzia* Meckel, 1856 under the same Law.

R. T. Leiper.